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CALIFORNIA ENERGY COMMISSION

STAFF WORKSHOP

In the Matter of:	) Docket No. 15-IEPR-05
	)
IEPR Staff Workshop on	)
Zero Net Energy Buildings	)
	)

CALIFORNIA ENERGY COMMISSION

1516 NINTH STREET FIRST FLOOR

ART ROSENFELD HEARING ROOM

SACRAMENTO, CALIFORNIA

THURSDAY, MAY 18, 2015

9:00 A.M.

Reported By: Kent Odell

APPEARANCES

Commissioners Present

Andrew McAllister, IEPR Lead Commissioner

Gabriel Taylor, Advisor to Commissioner Hochschild

Staff Present

Heather Raitt, IEPR Program Manager

Martha Brook, Appliances & Existing Buildings Office

Farakh Nasim, Building Standards Office

Maziar Shirakh, Building Standards Office

Eurlyne Geiszler, Building Standards Office

Panel Presenters

Cathy Fogel, California Public Utilities Commission, Energy Efficiency Branch

David Mehl, Air Resources Board, Energy Section

Ralph DiNola, New Buildings Institute, CEO

*Jason Caudle, City of Lancaster

*Chuen Ng, City of Lancaster

Bob Raymer, California Building Industry Association

Greg Mahoney, City of Davis, CALBO

Karly Silicani, Pacific Gas and Electric

Sue Kristjansson, Sempra Energy

APPEARANCES (Cont.)

Panel Presenters (Cont.)

Manuel Alvarez, Southern California Edison

Obadiah Bartholomy, Sacramento Municipal Utilities District (SMUD)

Also Present (* Via telephone and/or WebEx)

Jon McHugh, McHugh Energy Consultants, Inc.

Dan Suyeyasu, Architectural Energy Corporation

Ram Narayanan, Electric Power Research Institute

Larry Brand, Gas Technology Institute

*Marissa Blunschi, Southern California Edison

*Michael Nguyen, Energy Coalition

*George Nesbitt, HERS Rater

*Abhijeet Pande, TRC

I N D E X

I N D E X (Cont.)

P R O C E E D I N G S

MAY 18, 2015 9:07 A.M.

MS. RAITT: So as we're getting ready to get started, with the folks who are speaking this morning we have some places for you to sit at the tables -- for Cathy Fogel, Dana Waters, Ralph DiNola and then we have a couple of folks on WebEx -- so if you're in the audience and can sit at the table that would be great.

Good morning. Welcome to today's IEPR Staff Workshop on Zero Net Energy. I'm Heather Raitt, I'm the Manager for the IEPR.

I'll begin by going over the usual housekeeping items. Restrooms are in the atrium, a snack room is on the second floor at the top of atrium stairs under the white awning. If there's an emergency and we need to evacuate the building please follow staff to Roosevelt Park, which is across the street diagonal to the building.

Today's workshop is being broadcast through our WebEx conferencing system and parties should be aware that you are being recorded. We'll post the audio recording on the Energy Commission's website in a couple of days and a written transcript in about a month.

Also, at the end of the day we will have an opportunity for public comments. We're asking parties to limit their comments to three minutes, so that the maximum

number of participants have an opportunity to speak. We'll take comments first from those in the room followed by people participating on WebEx and finally from those who are phone-in only.

For those in the room who would like to make comments please fill out a blue card and give it to me. When it's your turn to speak, please come to the center podium and introduce yourself in the microphone. And it's helpful to give the court reporter your business card.

For WebEx participants you can use our chat function to tell our WebEx Coordinator that you'd like to make a comment during the public comment period. And we'll either relay your comment or open your line at the appropriate time.

For phone-in only participants we'll open your lines after hearing from the in-person and WebEx comments.

If you haven't already, please sign in at the entrance to the hearing room. Materials for this meeting are available on the website and hard copies are at the table to the entrance of the hearing room. Written comments on today's topics are welcome and they're due on June 1st. The workshop notice explains the process for submitting comments. And with that I'll turn it over to Commissioner McAllister for opening remarks.

COMMISSIONER MCALLISTER: Okay. Well, thanks

everybody for coming. I really appreciate particularly the folks who came from out of town; I see a few of you here and understand that it's not a trivial thing to take a day and help us work through issues in California when you have lots of other things going on. So I'm glad it's a priority for you as well as for us.

I also want to thank the PUC, our sister agency, for coming here -- Cathy in particular -- and helping us maintain alignment across agencies and really make sure that we're both taking advantage of what the other's doing and aware of everything that's going on in our respective environments. And because the PUC is also doing a lot on ZNE and I think to get to the goal that we have for ZNE we really need to make sure that we're doing everything we can and coordinating very well.

So also happy to be joined by Gabe Taylor from Commissioner Hochschild's office and who I think just built a very close to ZNE home, maybe a ZNE, so obviously very interested and knowledgeable about this as well.

Let's see, so I wanted to just back up a little bit and provide a little bit of context. There are some -- so there's a lot of excitement about ZNE, just there's a lot of positive energy about ZNE. It's something that I think we've seen in the world beyond our respective walls of the agencies and state government. It really has

traction, this idea of Zero Net Energy Building. It has this for certainly a significant portion of the population. You know, not a majority, but a growing minority. It's got this -- it's an attractive concept and it's sort of top level. It's something that people can understand, they think they can understand.

Our job is to make it something that actually, in practice, aligns with what people think they understand. Or at least we can kind of merge those two, because it actually gets pretty complicated pretty quick in terms of what is a ZNE Building and how -- for purposes of code for example, which is what we do in part at the Energy Commission -- we actually define it and how we execute that on the ground. So that everybody doesn't get incredibly confused. So at the top level that's kind of one of my primary concerns, is making sure that when we say ZNE it's clear what we're saying and how it's going to work out on the ground.

Also, I want to just commend our Building Energy Efficiency Standards staff for their long-term dogged persistence in getting cost effective energy efficiency done in new construction and new residential and new commercial, so Eurlyne over there. I think many of the staff are here, Bill Pennington is back there, he's been a real stalwart on this front. And I think really the state

is much better off for their efforts and we've now got newly constructed buildings that are incredibly efficient.

So as we move towards ZNE we have to figure out how to incorporate the self-generation component of the newly constructed building to compliment the energy efficiency in the right ways and the cost-effective ways. And have them work together as an optimal system, set of systems. And that sort of sounds maybe easy at the top for the uninitiated, at the top level, but it's actually quite difficult, in particular given the various regulatory regimes that we have in the state and around self-generation and around onsite versus offsite. We have natural gas and electricity in given buildings that we have to figure out how to deal with whether that's trading off or definitionally or something like that.

So there are issues that we -- there's a lot of excitement. There's incredible technology. There's just so many opportunities to optimize our buildings when we're building them. That's the time to do it, but we also have to make sure that we don't let regulatory barriers get in the way to doing the right thing for the customer, the owner, the occupant of the building. And so I think there are some areas that are pretty sticky and we need to work through and I hope we can have some productive conversations about those today.

So with that I'll see if Gabe, you want to say anything or?

MR. TAYLER: Sure.

COMMISSIONER MCALLISTER: Yeah, sure.

MR. TAYLER: Good morning. My name's Gabriel Taylor and I thank the Commissioner for the introduction. I'm here representing Commissioner David Hochschild who is our lead commissioner for renewable energy and obviously renewable integration will be a key of part of future ZNE concepts. The Commissioner unfortunately is offsite speaking at a conference, so he's not able to make it, but I expect to be involved very closely in the development of this section of the IEPR.

COMMISSIONER MCALLISTER: Great. All right, back to Heather and we'll get moving on the first panel.

MS. RAITT: Great, so yeah, our first panel. Setting the stage we'll hear from Farakh from the Energy Commission.

MR. NASIM: Good morning, everyone. My name's Farakh Nasim. I'm in the Building Standards Office in the Efficiency Division, so I'll be -- sorry, I'm a little too tall for this mic.

So I'm going to be kicking off the discussion this morning basically setting the stage for you all. I'm going to briefly review the IEPR definition that was

adopted in 2013 and then go into some of the work that the Energy Commission's been doing on this topic specifically within the building standards. The 2016 update of the efficiency standards are scheduled to be adopted at the next business committee -- business hearing -- business meeting, sorry. And then some of the work we're looking at doing going forward into 2019.

So the 2013 IEPR, we adopted the definition of ZNE Code Building. It was adopted jointly with consultation from the Public Utilities Commission and other stakeholders. And essentially the definition calls for onsite renewable energy resources. You need to match your building energy consumption to onsite renewable energy.

The Commissioner teed it up a little bit about some of the understanding, the awareness that's going on around this ZNE topic. One of the complexities we have is in the building code; our metric for energy is Time Dependent Valuation, TDV. Most folks don't know what that is, haven't dealt with it per se, they're used to the kilowatt hours onsite, how much they consume in the utility bill. But within the code we use Time Dependent Valuation as our energy metric. And that metric essentially uses both electricity and natural gas and accounts for both.

And the IEPR definition uses TDV as the valuation criteria for a ZNE Code Building.

The IEPR definition also essentially applies to a single building seeking a building permit and we've got this term "entitlement." And entitlements were included, because again like the Commissioner mentioned onsite versus offsite renewable there's going to be situations where onsite renewable aren't feasible, where we need to develop an off-ramp or an exception for those buildings where onsite renewable just aren't possible. And we'll be having discussions later this morning and presentations on some potential options for off-site renewable.

But in the definition, again it's onsite renewable with entitlements or off-ramp potentially for buildings that can't use onsite.

And lastly, we use the Energy Use Intensity Values, another definition that basically accounts for both regulated and unregulated loads. So Title 24, Part 6, our Building Efficiency Standards regulate heating, cooling, water heating, but we don't regulate or don't include in the Energy Budget applying it to plug loads. But this EUI or what we're going to be presenting a little bit later in my findings here, the Energy Design Rating, incorporates both the regulated and unregulated loads.

So a little bit of background on TDV for those folks who might not be familiar with it. Essentially it's a metric that accounts for buildings that use multiple

fuels. And so that's electricity and natural gas, propane. And it's essentially just a forecast of costs for generation transmission distribution for each of those different fuel types. And it recognizes that there's a cost to be paid for consuming energy at peak periods. And essentially rewards or values highly measures that reduce peak energy use.

I'll leave it at that and there's a lot more detail, but no time for those details now. So within ZNE Code Buildings something that again is a little bit different than what most folks' understanding of ZNE is. ZNE for, at least my understanding, was as an operational metric, but within code the definition applies to design and construction of buildings prior to occupancy or prior to the time when the building has been reviewed and approved by a building department.

And the ZNE Code definition doesn't imply that you're going to zero utility bill either. And there may be some outreach and education that needs to done, so it's this metric and this designation doesn't confuse the public and make them think that if they have a ZNE Code that they should be getting zero bills.

And again, the utility costs will depend on the operation of the building. And that's far after either the design or the permitting for the home has been done.

And then another issue that we have is how we optimize solar installations with this metric. Obviously PV systems or other renewables will be used to offset the TDV use that's caused by the building. But, you know, whether that's onsite or offsite that's an issue we'll be talking about.

The metric doesn't ignore natural gas use, so part of the energy use that's being offset by the PV system will be for the natural gas use in the home. And again, most folks don't understand that.

And then lastly this metric, because it accounts for all different fuel types, various fuel types, we don't require that a building be all electric.

So as far as the 2016 Standards, like I said we're scheduled for adopting the next update in June. But we've made several efforts to try and keep improving the efficiency of the home such that the PV system size can be minimized. And we're still working on that to get loads down as much as possible.

Some of the major significant provisions of this update include both high-performance attics and walls to reduce the NVLP (phonetic) requirements, tighten those. We've incorporated a tankless water heater as our prescriptive baseline. And then we've moved towards proposing mandatory requirements for all efficacy lighting

within the home. Lighting isn't part of the Energy Budget in the Standards, so this requirement is an effort to try and dent some of the unregulated loads that I'll be talking about a little bit later on.

And then within the larger framework of working with the PUC and our utility partners, we're initiating programs through the IOUs to help train builders on the changes that are coming with regards to the attics and walls and those programs are being provided, again by the IOUs.

I mentioned the Energy Design Rating. This is a proposal in the 2016 CALGreen Code. We've introduced a new tier, a ZNE Code, which would require an energy design rating of zero and if you can attain that rating then your building would be a Zero Net Energy Code Building. This isn't a mandatory requirement. It's a voluntary provision within Part 11, but if that provision is adopted by a local jurisdiction then they would be -- those newly constructed homes in those jurisdictions would be ZNE Code.

The score is again based on assumptions and calculations within our Alternative Calculation Manual, the ATM. So anyone interested in details about this rating can find that information there.

And again, like I mentioned we include both regulated and unregulated loads in this rating. Regulated

loads, like I mentioned, are space heating, cooling, water heating. Lighting, though regulated by the Standards aren't part of the Energy Budget and that's why like I mentioned in the last slide any improvement in lighting won't be reflected in your components margin. But they are included in this rating.

Plug loads and appliances, this is an issue that we need to address going forward as well. Currently, we make assumptions about plug loads and appliance use within a home. And really, we need more information on this issue. On plug loads, how many there are obviously with an increase in technology and the number of options both have for different technologies.

Their usage has gone up and I'll show you a slide later on, that points to the fact that unregulated loads are making up a bigger component of the energy use in our homes. There's a definite formula for how you calculate it and basically the rating will be calculated within the residential software approved by the Energy Commission.

So the 2013 IEPR identified several issues that we needed to address going forward. Some of them I've hit on a little bit, but the first one was the onsite versus offsite renewable. We need to figure out a mechanism for how we can enable offsite renewables and have them comply and be enforceable. And be tractable such that a building

official can comfortably and reliably sign off a permit for a building that doesn't have a solar system or a renewable system on that site.

Another issue is as more and more renewable get added to the grid, what issues come up with those higher levels of renewables, both positive and negative. And how do we address any of those negative impacts and mitigate those impacts.

And then again, the IEPR in 2013 had a definite term "entitlements." What that means and what those could be is another area that we need to discuss and try to identify options for.

So this slide. It's probably pretty busy, small text, but you've got the slides hopefully in front of you, so you can follow along. But essentially what this is showing is using the 2016 Building as the proposed Building and the 2008 Code Building as your reference this is the PV system size by climate zone that you'd need.

And there's four different bars here. The one on the left, the red one, is the PV system size you'd need to offset all of your unregulated loads, plus the energy use from a 2016 compliant home.

And the next two bars are for buildings reaching Tier 1 and Tier 2 and then the last one is the unregulated loads component that I mentioned. And what you can see

here is that for the most part in the coastal climate zones, a 3 to 4 kW system can get you pretty close to our ZNE Code definition. What you also notice in those climate zones is that unregulated loads make up a significant portion of the TDV of those homes. And so, like I mentioned we do need to address and improve on our assumptions for plug loads.

However, if you look at the Climate Zones 10 through 16 to your central cooling climate zones there's quite a bit of energy within the home, regulated loads that we can still identify and try and improve on. And that's one of the goals for 2019 is to identify additional measures to reduce those loads such that you're not requiring a seven-and-a-half kW PV system in Climate Zone 15 to get to ZNE Code.

So like I just mentioned, you know, additional efforts for the Commission: one, identify additional measures. Get those loads down even more in the climate zones where it can be shown to be cost effective. Identify homes where ZNE onsite can't be met and we need to develop exceptions for those homes. And again, we'll be discussing offsite and community solar, shared solar programs, those types of issues later on today.

We'll need to update the TDV to reflect changes in energy supply and costs.

We'll be re-evaluating the PV cost effectiveness given upcoming CPUC decisions on them and utility rate changes. But also Cathy Fogel will describe more about what they're doing on this topic. And we'll be working with them closely to try and identify studies and work that can be done to answer some of the questions that we have outstanding.

Again, we'll need to revisit plug load assumptions and as we get more information, try and make those reflect conditions as we see them today rather than, you know -- I believe it's been some time since we've updated those values.

And then lastly, identify ways that PV can be better integrated into the grid whether that's through technology such as smart inverters or batteries or something else that we haven't seen yet.

So that was the main component of my presentation. This last slide is really just a cleanup. There was an issue with the published definition in the IEPR. And here's a possible change, not necessarily anything that we're proposing, but really just a cleanup.

That was the end of my presentation. If there weren't any questions or comments, I can ask Cathy to come up.

COMMISSIONER MCALLISTER: I do have one question.

Really this last -- I'm very happy to see this last side, because I think myself reading it kind of saw that issue -- that "Whoa, that wasn't what we discussed in the IEPR and how is that going to document," kind of thing. But also just trying to make it more clear, more reflective of our actual process.

And I did have a question actually about TDV. I'm sort of reading between the lines and thinking about this. It seems, you know, there's some lag between our update of TDV and sort of the actual every three years or whatever it is we update the TDV, every two years I guess update the TDV. We're seeing lower prices in the middle of the day when an onsite renewables, you know, solar say, would be generating, right?

So I guess I'm wondering, is that kind of the driver behind the consideration of -- well, certainly that makes it hard to find cost-effective PV, right? So if you're generating in the middle of the day when your grid-related costs benefit kind of profile doesn't sort of tilt towards cost effectiveness we've got to figure out a way to, "Okay, how do you make Zero Net Energy if you can't utilize the most cost-effective resources in the middle of the day, because of the grid issues?"

So unpacking that I think is really important. And I'm assuming that's why you're sort of driving bringing

in batteries, bringing in smart inverters, bringing in those sorts of things to try to figure out how to make the PV resource more valuable for purposes of cost effectiveness? Maybe you could just unpack the way we do that a little bit more or maybe there's another staffer that's sort of more on the TDV front? Maybe that's Martha or Bill?

MR. NASIM: Why don't you take that?

MS. BROOK: This is Martha Brook. I'm going to talk a little bit more about this when we talk about ZNE Metrics. But one thing I thought you were going to ask, but you didn't quite ask -- I'm going to answer the question I wanted you to ask and then we'll see where we go.

COMMISSIONER MCALLISTER: Yeah, okay. Great. I'll see if that's the one that I tried to ask, but didn't do very well.

MS. BROOK: Yeah, probably not. But the important thing about TDV is that it's not just a snapshot of today's grid. It's actually looking at today's grid and the grid 30 years into the future. So we already make assumptions that we're going to meet our renewable portfolio standard goals. I mean, we're still discounting that future of the grid, because it's a net present value. So from that point of view the future doesn't count as much

as the present, but we are considering all the information we know about in terms of the expected grid of the future and the energy costs associated with that.

And so the point that you were making about the fact that PVs might not look as valuable as they once have been in terms of now we have all this access capacity in the afternoons instead of, you know, high prices. We're actually almost wanting to give away that electricity. That definitely does reduce the value of resources that are coincident with that hump.

And then obviously, I think your suggestions are correct in terms of other ways that you can value that in terms of storing electricity that's generated during those afternoon hours.

COMMISSIONER MCALLISTER: Okay. Thanks. You took the one step further that I probably should have, but that was good. And I see Bill wants to chime in here, too.

MS. BROOK: Do you want to sit down there?

COMMISSIONER MCALLISTER: If you just sit down at the table, that'd be good.

MR. PENNINGTON: So I would just add that we do want to look at the grid impacts that are foreseen for adding large amounts of PV to the system. And with smart inverters being pretty much here that may help in reducing the disruption that PVs can cause by tripping off and not

constant and every house being different. And so a lot of possible mini events, so that seems logical to be expecting those to be part of the standards.

In terms of charging that is along the lines of what you were saying. That we do anticipate that charging can help make better use of the power that the PV system is producing at the conditions that are right for that production, but not matching very well the load curve that the system is seeing. So we do want to explore ways to maybe through using batteries -- maybe I said charging incorrectly earlier -- but using batteries to make the best use of that production at the time that it really is most valuable. And perhaps that can improve the cost effectiveness of the system as well.

COMMISSIONER MCALLISTER: Thanks. I guess maybe there's a future -- later in the day we can talk more about TDV and dig in when it's appropriate. I guess I want to just point out that TDV is more of a social grid-wide kind of impacts. And then there's a retail adder, which sort of tries to align it more with retail rates. But it isn't actually, you know, consumer specific, cost effectiveness based on current rates themselves.

And so I guess there's a little bit of a disconnect there in terms of the net metering and the reforms on rates that the PUC is going through. Certainly,

I think we want to know about them and sort of the impact the way we think about this. But it's actually not directly incorporated into the TDV calculation, if I understand that right.

MS. BROOK: It's not directly incorporated. We do think that TDV is the closest to an average consumer cost of electricity. And that's important, because it's implemented through code. So it's never going to be appropriate to have a rate-based approach, because these buildings have to survive multiple updates to rates.

And it's a very long-term decision that we're trying to impact. And so we have to be careful that we are using all available information, but still it's an average. It's not specific to a consumer or a building in one specific, you know, instance.

COMMISSIONER MCALLISTER: Okay. Yeah, I'll leave it there for the moment and we'll probably have occasion to talk about this a little bit later. Thanks.

Thanks, Farakh.

MS. FOGEL: Hi, good morning everybody. I'm Cathy Fogel. I'm with the California Public Utilities Commission in the Energy Efficiency Branch. And I've been working on the Zero Net Energy issue for the CPUC for about three years.

So as I get started I'm going to -- I work with

Mindy Craig of BluePoint Planning. She's going to distribute some handouts that I'm going to refer to later in the talk. So we don't quite have enough for everybody, but they are also on the printed handouts, so if you didn't get it you should be able to see this.

So what I'm going to talk about today is I'm going to review, just briefly, the goals the Commission has adopted. Then I'm going to look at our new residential activities and then new nonresidential activities and programs and close by reviewing some of the upcoming research and activities that are in the future.

Let's see, so just to review. The CPUC and the California Energy Commission adopted ZNE Building Goals in 2007 and '08 that all new residential and all new commercial construction shall be ZNE by 2020 and 2030, respectively.

The CPUC also adopted the goal that 50 percent of existing commercial buildings will be retrofit to ZNE levels by 2030.

And then on the Governor's side, in 2012 the Governor issued an executive order calling for new state buildings and major renovations of state buildings to be ZNE by 2025. And also to accomplish that for 50 percent of existing state-owned building area, again by 2025.

And then just last year at CPUC the Commission

directed utilities to launch and ramp a K-12 Schools and Community College ZNE Pilot Program in '15 through'18.

And you can see on the bottom there are some of the buildings. The DPR Building and the IBEW Building that were supported by the utilities ZNE pilot efforts.

So just to review again, the CPUC adopted the Strategic Plan in 2008. It included the ZNE Goals and then subsequent to that the Commission launched, in 2010, a ZNE Commercial Action Plan.

And we were able to engage a pretty good segment of the market sector. You can see some of the logos up there. And had pretty active ZNE activities in stakeholder meetings and development of case studies and sharings lessons learned and so on from 10 through 12. So we are hoping to take up a similar approach in the homes area this year. And engage a similar variety of market actors.

So it was the same strategic plan that also directed the utilities to align their programs with the ZNE Goals. And some of the programs that the utilities do that through are indicated here.

Codes and Standards, we will probably talk more about that today, but the utilities provide case studies and technical analyses to support CEC work in Codes and Standards.

We've got -- they have an Emerging Technologies

Program that tests specific technologies and also undertakes specific demonstration projects in specific buildings.

We've got our new construction programs: California Advanced Home and Savings by Design in the res and non-res new construction area respectively.

The utilities Reach Code Program provides technical analysis to support local governments that want to adopt to reach codes that exceed Title 24.

And there's also a fairly extensive education and trainings, both out at energy centers and then individual programs have them as well.

And again, some of the buildings, it looks like I repeated DPR there again. But the One Sky Homes Cottle House in San Jose was also supported by PG&E's Pilot Project 10 through 12.

So now, just turning to what we're doing in the new construction area in residential, one of the things I'm excited about is this year the utilities in their California Advanced Home Program launched a new incentive approach that for the first time gets away from awarding incentives based on exceeding Title 24 by a certain percent and reorients the incentives around aiming towards zero or ZNE.

The structure is based on the HERS Tool developed

by the Energy Commission, but then modified slightly to add additional points and so it's called a CAP Score or California Advanced Home Program Score. And so the entry level to access incentives is a CAHP Score of 84. That's not quite equivalent to a HERS Score, but it's a little bit similar. And then there's -- for that the builders get access to about $300 in incentives. And then incentives for each point thereafter up to 75 and then beyond that or below that, if you will, the incentives increase even further.

So we're excited about this new incentive structure and it was launched this year. And Conrad Asper is here from PG&E and can probably answer some more detailed questions if you have it. The Multifamily High-Rise Incentive structure did remain the same. It's based around the percent of exceeding Title 24.

Also, this year the utilities have launched a Code Readiness Initiative to support the big two measure the Energy Commission is trying to add to 2016 Code and that is High Performance Attics and Ducts and High R-value Walls.

And there's several things that the utilities are doing. They're providing dedicated design and construction assistance. So through design charrettes, value engineering, meeting coordination, working with

manufacturers in making sure they have their installation guidelines in place and making sure they're able to support training for builders for new products and assistance and verification during construction.

And for this the builders agreed to certain things like post-occupancy monitoring for temperature, moisture and energy use. And also the creation of case studies of their homes that will demonstrate best practices and lessons learned. And in particular gather cost data on the initial costs of installing these measures and then how costs decline as the builders become more comfortable with the scaling the new technologies into the homes.

A key component is additional financial support for financial support for builders that participate in this. In addition to the 250 hours of design assistance, which is in-kind assistance there's up to $30,000 of incentives available for builders that install both high-performance attics approached and high R-value approaches. And then the builders, by doing that, will ramp themselves up higher on the CAHP incentive scale and have the opportunity to access up to $2,600 more incentives.

So it's a pretty good deal for those builders that want to develop these techniques as early as possible and get ready for 2016 Code. And we're starting sort of small. This year both PG&E and Edison are hoping to work

with just three builders, but for 25 homes per builder is required to enroll and we're still waiting to hear from San Diego Gas and Electric and SoCalGas, how they will be participating. And the total initial budget for this rollout is about $800,000. So not a large project, but we're excited about it and the utilities are working closely with the CBIA and the Energy Commission to design and roll this out.

A couple of the things that have happened in the new homes area in the last I guess about ten years now, is the utilities -- all of them have had over these years either a ZNE Pilot Project or a Sustainable Communities Pilot Project. And they've all undertaken, as I've mentioned, demonstration homes, so some of the homes supported by utility programs are indicated here.

One is the DeYoung home in, I believe it's Clovis, in the Central Valley. It's supported by PG&E. Also supported by PG&E was the Honda House in Davis, a Zero Net Energy Home. Edison supported the ABC Home: Affordable, Buildable and Certifiable, which is down in Irvine. And then San Diego Gas and Electric supported KB Home and their development of the Zero House in I believe it's San Marcos, California.

But the utilities also did some other things with their ZNE pilots. Overall on the non-res side they

supported the development of about 16 non-residential ZNE buildings by providing technical on design and financial assistance. And they also undertook technology assessments of basically systems approaches to support ZNE.

PG&E had an architectural design competition. I think it's called "Architecture at Zero" which has entries now from around the world. And those entries design a -- submit a potential design from an actual building site that wants to go ZNE.

They've also undertaken many studies. I come back to that a little bit at the end. Some of the larger ones are the ZNE Technical Feasibility Study and the Road to ZNE, both of which were completed in 2012.

And also a new pilot, which is supported actually by the CPUC's California Solar Initiative RD&D funds, which just launched this year in Fontana, is a partnership between EPRI, BERA Energy, Meritage and Southern California Edison to study again a ZNE Community type approach. And looking at grid integration issues, optimizing load shape using your various distributed energy resources onsite: EE, DR, DG storage, electric vehicles. And also testing different aspects of grid management as linked into this community.

So where are we for ZNE residential home market developments?

This is a -- the findings here are based on a study managed by PG&E and undertaken by TRC just completed this year. And what that study found is if you define ZNE buildings as needing to first accomplish deep energy efficiency to a level that exceeds Title 24 by 40 percent -- no matter what year you're considering Title 24 exceeding it by 40 percent -- then what they've found is that there are about 1,100 ZNE type homes in California currently.

Most of these are near-ZNE, which is that they exceed Title 24 by 40 percent and they have some solar, but not enough to fully offset their load. They only found about 16 full ZNE homes in California right now, so this comprises a pretty small percentage of the market. It's growing. In 2014 it amounted to 1 percent of the new homes market.

But in Climate Zone 12 where SMUD is, and we'll hear from SMUD later today, ZNE-type homes comprised about 35 percent of new homes in 2014. So you can see that utility engagement and utility incentive and program design does really make a difference for the early penetrations of these homes.

And then another point, if you say, "Well, maybe it shouldn't be 40 percent above Title 24 as a threshold," if you do lower that to 30 percent above ZNE, above Title

24, then you have more like 10,000 ZNE-type homes which are currently in existence. So we'll have to keep on tracking that as we march along towards our 2020 goals.

And who is actually pursuing ZNE buildings? The study found that over 50 builders have constructed ZNE-type homes throughout California in over 130 cities --

COMMISSIONER MCALLISTER: Hey --

MS. FOGEL: Yes?

COMMISSIONER MCALLISTER: Thanks, Cathy. So sorry to jump in here.

MS. FOGEL: Sure.

COMMISSIONER MCALLISTER: I guess I'm wondering did you define ZNE type?

MS. FOGEL: ZNE type would include any building that exceeds Title 24 and either has some PV or if it doesn't have PV it's just ZNE ready and we included the ZNE ready in this as well.

COMMISSIONER MCALLISTER: Okay. So basically you're saying that the 10,000 -- if you relax it 30 percent then the 10,000 is basically just homes that exceed Title 24 by 30 percent?

MS. FOGEL: By 30 percent, yeah.

COMMISSIONER MCALLISTER: Whether or not they have solar or whatever.

MS. FOGEL: Yeah. And it's again every 30

percent despite what code cycle we're talking about.

COMMISSIONER MCALLISTER: Yeah, okay. Great, thanks.

MS. FOGEL: Again, so we've got about 50 builders in over 130 cities. I think this is pretty exciting. It's a pretty wide engagement even at this stage and they're distributed throughout the state. You can see they're concentrated in the Sacramento area, again mostly due to SMUD's work I'm sure -- and also in Sonoma. But in L.A., San Diego and the Bay Area as well and another cluster in the Fresno area.

So something we're excited about is we're going to be launching a Zero Net Energy Action Plan this June 9th at the CPUC. And you are all invited to attend if you would like to, we will also have Webinar call-in information. And I guess I'll be posting that on our CPUC website if you want to participate that way.

And so I've been working on this, again with Mindy Craig from Blue Point Planning. We've had about 100 stakeholders participated in developing the plan elements. We had active workshops mostly in 2013 and many subcommittee calls, etcetera. It took a little while for me to get it through the approval gauntlet and my agency and also the Energy Commission agency, and then find enough time myself to get this going. But we are going to launch

it now and it's focused on six main goals. The first goal is creating awareness about the value and benefits of ZNE and building demand. The second goal revolves around improving training and education for ZNE amongst the trades and also realtors and professionals, designers, architects, etcetera.

The third goal revolves around ensuring the availability of design tools and energy modeling tools for builders and energy modelers to pursue this goal.

The fourth goal is supporting increased financing and ensuring affordability of ZNE goals. And making sure ZNE homes are better valued.

The fifth goal is addressing some of the grid infrastructure questions in planning.

And the sixth goal involves aligning regulations both across state agencies and between state agencies and local governments.

And the handout we distributed does show an overall critical path, which I'm displaying also here, which is comprised of the various components of each goal strategy.

I'm not going to go through this now, but I will be talking about that more on June 9th and happy to take any questions if you have that later.

So that wraps it up for residential new

construction activities. And now I want to turn to nonresidential activities.

So one of the new things happening this year is the utilities have just recently launched a Nonresidential Existing Building ZNE Pilot, that's aimed at K-12 schools and community colleges. It was directed by the CPUC at the end of last year.

And the utilities have just -- they're getting this going. The target is to develop 13 to 18 demonstrations of school buildings by the end of 2019. And it's got several elements here you can see. The main one is the demonstration buildings themselves and but also there will be technical training provided, both to the building managers and also recognition for specific buildings. And then broader institutional training: so to school boards, parents, you know, parent-teacher conferences, students, etcetera.

Codes and Standards is really revolving around can this pilot project be mined for case studies useful to advance a ZNE school's requirement under Title 24, so there'll be some collaboration with the CEC when we get to that stage.

And then the fifth element is taking the lessons learned from this pilot and thinking about how to scale it up into an actual program.

So the things that will be required of the schools that participate is a written commitment, obviously. And a willingness to design and retrofit their buildings, their own budgets to support it, plus in addition to utility funds in some areas, which I'll go over next. And then a willingness to share their experiences.

So this pilot does rest on a variety of funding sources. This slide is a little misleading. The Pilot of In-Kind Services refers to the utility provision of design and technical assistance and education and training. But beyond that the total budget for this is about $9 million up through 2019, so about a little less than 2$ million a year for budget. And about $4 million total of that will be to buy down the incremental costs of additional measures for schools.

And again, the pilot is attempting to build on Proposition 39, which has allocated about $500 million a year to energy efficiency in K-12 schools and community colleges over the next five years. And also the school districts' own ability to find additional funds themselves.

Again, we're hoping for about 13 to 18 demonstration buildings. In the breakdown you'll see here, importantly, community colleges will comprise the smaller portion of these pilots; only about 3 to 5 and with K-12 representing about 10 through 13 on utility breakout as

shown in the screen. This does reflect the general allocation of funds under Prop 39 as well.

So beyond this new pilot what have utilities been doing for the last several years on ZNE and what has it resulted in? So I've got here a slide that I put together based on a data request of utilities. It is utilities self-reported data, so it's not completely independently verified by us, but for now it's information we have.

And what it shows is that the utilities supported about 85 nonresidential ZNE buildings between 2008 and 2014 when I put together this slide.

And excuse me -- that there were about 85 total ZNE non-res buildings in California at that time and the utilities supported about 76 of those in some way: financial support, technical support, design assistance, etcetera.

And in this count I'm mixing in not only ZNE-verified, which is in purple there, but ZNE emerging buildings that have set a target to achieve ZNE, but it's not yet been verified. And then also what we're calling Ultra Low Energy Use Buildings, again non-res buildings that are exceeding Title 24 by 40 percent. Which may or may not be the right cutoff, but it's the one we use there. And again that's both verified and emerging buildings, so those that have set that target, but maybe not quite

achieved it yet.

And you can see the breakdown is in the building types where this is being pursued. It's primarily emphasizing office and multifamily buildings and educational buildings, etcetera.

And another thing we collected information on was again, the self-reported energy use intensity of these buildings where that was available from the utility data. And that shows an interesting trend here, which is that the EUIs are getting down to around the 20 to 40 KBTU per square foot, which New Buildings Institute talks about EUIs being around, ideally for ZNE buildings, around 20 to 30 KBTU per square foot, but also some of the higher KBTU per square foot levels, EUI levels, for multifamily buildings over on the right side.

So it is really important that the ZNE pilots continue to drive down the EUIs of the buildings they're treating.

There are some challenges on the non-res size. One of the main ways utilities support non-res ZNE buildings is through their Savings By Design Program. There's a number of challenges with that program. First of all, they have about a 50 percent level of free ridership, which is to say about half of the buildings that they're providing incentives to, the relevant folks say they would

have pursued the efficiency reductions without the utility incentives.

So we're seeing too many projects where utilities are coming in late in the day and just kind of throwing incentives at something that probably would've happened anyways. So we need to work with them to get them to move upstream more and to get new participants in this program. And to truly change the design and execution of those buildings that we're providing incentives to.

There's also challenges with the Energy Modeling approach. The utilities are overestimating their gross savings from these by how they're doing their modeling.

And another challenge is the penetration rates. They vary fairly widely, you can see in this slide, from between 3 percent to 40 percent depending on where the year's falling in a program cycle. But we are seeing some lower penetration rates there than we might like to see, around 3 or 5 or 9 percent. So we also need that program to reach a greater share of the market.

Some of the things to CPUC is doing on the non-res side is we've just launched with NBI a California ZNE Watch List, which we're hoping will come out about quarterly. And which will list the ZNE buildings as we are aware of them in the non-res area in California, and provide some basic information about them when those

building owners and managers are ready to release that information. So we've just launched the first one of those and we'll be doing a couple more this year.

Another thing we worked on last year with the Energy Commission and also an advisory group of about 20 trades folks and state government agencies and utilities and SMUD participated, was to develop the basic framework for a recognition strategy for ZNE buildings. This is something that's been recommended to be important as far back as the Strategic Plan in 2008. But especially in this early adopter phase that we're in, it's really important for those folks: designers, architects, owners to get that recognition. Like that's why they're doing this often times, not for "Does this make financial sense? Does this pencil out? You know, am I covering all of my additional costs?"

So we've developed a general strategy for this and it's got great buy-in amongst a number of key actors. And the idea is sort of languishing right now awaiting identification of where it will get some funding. So we're hoping that will be identified this year and next, either through utility funds or Energy Commission funds or foundation funds or some way to take this forward, because we do think it's important.

Another thing, the CPUC has supported the New

Buildings Institute with -- they're on contract to support our non-res work -- is the issuing of a ZNE Communications Toolkit, which provides a lot of messaging tips and beautiful slides and basic data and case studies about ZNE. So helping those folks early in the process of considering ZNE, figure out how to talk about it internally to their superiors and other stakeholders, both internal and external. So that's available on the NBI website if you're interested in that.

Another thing NBI has done with us is to undertake some, what we call ZNE Early Adopters Trainings. They've done about six of these in the last couple of years and reached over 400 folks in those trainings. The people attending are largely state building managers and local government officials who have been our target audience. But also some schools officials. There was a large workshop on that, I guess the end of last year, and we're moving into the private sector a little bit.

These workshops give participants an overview of California ZNE Policy Goals and they foster peer-to-peer networks, again showcase case studies, provide customized tools and resources and help participants develop policy targets. And it's important to reach and support these cohorts, because they're kind of the gateway advocates for ZNE, both within their organizations and externally. So we

want to support those early adopters as much as we can.

Okay. Finally, wrapping up here on new research areas. So mostly here I want to talk about some of our research around Distributed Resource Planning and Grid Planning and how that relates to ZNE.

So the Legislature approved AB 327, I guess last year, and directed the CPUC to require the utilities to file Distributed Resource Plans focusing on distributed energy resources, clean energy resources, renewables, energy efficiency, storage, DER. And so those plans will be filed by the utilities in July of this year. And you can see some of the components that are required in the plan at the top there.

First is just looking at, "What's our current capacity to handle distributed energy resources on the Grid?" And secondly, how can we develop an approach to identify the locational value of certain DERs at certain places on the Grid? So the utilities will submit a draft proposal to how to assess locational value and that will be reviewed by the CPUC and adopted at some point.

And then the final phase, of course, is identifying optimal locations for distributed energy resources based on our mapping of the Grid current capacity and assessment of additional locational value. That will be a multiyear process to do that. We're just getting

started in this.

But for the purposes of ZNE, the important thing to realize is that the utilities were required to submit three scenarios as part of their distributed resource plans in July. And they're shown on the screen there.

So the first is basically a business as usual trajectory. Just continuing current adoption rates of distributed energy resources based on the IEPR trajectory case.

And then there's a high-growth case, again based on IEPR. And then the CPUC required a very high-growth case that includes the thought that ZNE becomes required under Title 24 and much, much more. It includes the full achievement of the Governor's most recent 2030 RPS Goals, so that we acquire 50 percent of our grid electricity from renewable sources by 2030.

It also includes -- you know, require the Utilities to consider existing zero electric vehicle goals and action plans, storage goals, and also DR goals as well. So it's a very aggressive adoption scenario.

We also will be launching a study in just a few months to more closely -- from the study managed by the CPUC to look at customer-distributed energy resource grid issues. And again, we're including ZNE in that study, looking at if there are particular costs and benefits to

the distribution system requiring all new homes to be ZNE by 2020.

And then looking at what are the different long-term costs and benefits to the Grid, if the ZNE Homes Goal is achieved under different scenarios including just on-site solar, on-site solar plus storage, or off-site renewables. So that and several other questions will be something we'll be considering in this study.

And then Farakh mentioned the net energy metering tariff. The CPUC will be adopting a successor net energy metering tariff by the end of this year. And again, we've considered the ZNE goal and some of the analytical work that will inform the adoption of that tariff.

The CPUC, the relevant rule-making is indicated there, I guess it's 1407.002. And in that proceeding they've issued a draft scenario analysis tool. It's like a spread sheet tool that users can input information to and identify scenarios to be analyzed. We'll be coming out with a final tool at the end of this month.

And in those scenarios, there is a ZNE component. And that assumes that ZNE Code is achieved and as a result 400 megawatts of new homes solar will be added to the grid on an annual basis, based on this ZNE Code being adopted.

Now it's a pretty crude assumption. It's just a standard adder that can be added into any scenario here.

But what we want to do at the CPUC is asses the total costs and cost-allocation and cost-transfer issues that might come up in adoption of a new NEM successor tariff. And we want that to be considered as we're also considering ZNE under Title 24.

Another study we'll be launching later this year is proposed, so we think we're going to do this. But looking at the challenges particular to community scale distributed energy resources and using that as a way to meet ZNE. So we want to look there at the permitting requirements associated with siting and sizing systems, tariff frameworks that allocate costs and generation to individual units, least cost options and issues relating to grid impacts like impacting voltage and frequency levels, etc.

And most particularly ask the questions about "Can community scale distributed energy resources sited close to a substation of a development feeder help mitigate the grid impacts of a development's new load, while alleviating the need for onsite distributed energy resources?" And also, "How might new IOU green option tariffs support ZNE Goals or not?"

So I've put that out there, because we will be taking comments on the scope of this study. So if you want to comment on the scope as we get going here, you're

welcome to do that. And also the draft final study will be available for comment as well.

And just related to that, something that the CPUC and the Energy Commission participated in last year was this -- activities related to the Pacific Coast Collaborative. And the Pacific Coasts Collaborative involves the states of California, Oregon, Washington in the US and also British Columbia, in Canada. And they've adopted a pretty aggressive -- well not aggressive -- they've adopted a shared vision around promoting energy efficiency and climate resilient infrastructure.

And their goal for ZNE is to transform the market for energy efficiency and lead the way to Net Zero buildings, so it does involve the governors and the state agencies of those states and the province of BC.

So one of the first things that that group is doing is developing a joint codes and standards for ZNE. And I believe Farakh and someone from our office has participated in the first efforts there.

But we also last year commented on the draft DOE definition of zero energy buildings. It's a little bit relevant to renewables discussion here. We've broadly recommended that there be something like a ZNE loading order articulated. And that loading order is reinforcing the idea again is the first thing for ZNE buildings is

always to go after the deep energy efficiency first. And to achieve best practices for your building or climate zone that you're talking about.

Then we want to meet the onsite load with onsite renewables, if possible. If that's impossible for some reason, going to community solar systems that can provide local jobs and other benefits to cities and jurisdictions such as advancing their GHG goals.

And then only at that point, if that's impossible for some reason should a building consider using certified RECS. And when I mention certified RECS, this doesn't necessarily represent my personal view or the view of the CPUC or the CEC. This is again commenting to DOE how if they're going to develop a definition that's workable nationally, but this is the way we would advise them to think about it.

And finally, finally, we've got some plug loads research going on. I wanted to make sure folks were aware of this. And it's just in early days, so we've completed Phase 1. The utilities have completed Phase 1 on miscellaneous energy loads last year, which basically amounted to a literature review to look as best estimates for MELs. And what they say about energy consumption and where the gaps in literature are. And also a lit review of non-intrusive load monitoring methods.

And Phase 2, which is just getting going now, will look at what's the best model to model MELs in a more nuanced way and what do we need to know about sample size and timeframe for future predictive models.

And then Phase 3 would actually develop and test statistical models to better predict plug loads' usage.

And this is contained in a CPUC Zero Net Energy in New Construction Road Map for research for the next three years. So if you're interested in that, you can see me or visit the CPUC site to find out where our ZNE New Construction Research Road Map is. But this and all the other studies in that will be available for comment, both the draft scopes, and the final draft report as well.

Okay. Finally, just some closing thoughts here. Basically, we need to continue to work to transform these markets. And I emphasize transforming the markets, because we're working primarily with utility programs that are going after short-term immediate savings. And we need to expand those and expand the thinking to not only go after immediate savings, but how we're shaping the market to be transformed over the long term.

Some folks have said maybe there needs to be new legislation directing a market transformation program for ZNE. I don't know if that's going to happen, but we can do a lot with utility approaches in the meantime.

And in those, we need to engage and scale the efforts of early adopters. It's really critical to get those folks who want to lead, and give them the chance to and support to, and then scale what they're doing. So we're moving beyond just one-off buildings and getting to subdivisions and communities.

And in that the important thing is to reduce our first costs through our incentives. But also I think the High-Performance Walls and Attics Initiative is a great example of how utility programs can go further and work directly with suppliers and builders, to undertake some new approaches that can't be achieved just through offering incentives. And to do that at some level of scale.

We need more subdivision pilots and programs addressing subdivisions.

And for the Savings by Design, we need to increase or improve how that program is aiming at ZNE-type energy use and intensity levels. So not just going beyond Title 24, but really just taking to the next step to go to ZNE-type EUI levels in the building we are supporting.

And that might be possible by considering kind of an early adopter cohort support approach. This may be based around a model that the Prop 39 Pilot took up, which is focusing on a specific building type. We've got K-12 schools or community colleges for our first pilot here,

reaching maybe about 15 buildings. So maybe for the next cohort we should have utilities focusing on state or local government buildings, because we know there's a lot of interest and activity there. And developing a better support for those early adopter efforts and allowing them to form part of a cohort.

And as always: greater awareness, education and training, which is a perpetual challenge.

I do think the ZNE Building Recognition Program is important and provides the opportunity to highlight those early adopters and give the recognition that they deserve and crave. And in doing so raise awareness, and mine what they're doing for case studies that can educate and train folks.

And then finally, we're going to talk a lot today about renewables and off-set renewables and we certainly, at the CPUC, welcome that conversation. We're glad it's started and are looking to see where it leads and to contribute to it with some of the studies that I mentioned in today's discussion.

So with that, that's it. There's a few more extra slides in there. Some of the extra slides get at the specific cost effectiveness and budgets of utility programs and savings. So if you have any questions there, I'm happy to address that as well. Thank you.

COMMISSIONER MCALLISTER: Thanks very much, Cathy. That's great, tons of stuff as usual going on over at the PUC. It's awesome. And many of those efforts, I think we've actually collaborated on over the last few years, and so I think we're probably -- more than probably very aligned on this.

I just had a couple of comments. You know, I think we're working together in a lot of ways that really make sense. I think that sort of handshake between the agencies where the PUC and the IOUs are able to do programs that more get out there and affect the marketplace. And try to experiment a little bit and get lessons, so that over the various iterations we get to something like best practices that actually becomes plausible in some cases to actually incorporate into code. And it turns out to be cost-effective and meets all those constraints we have to getting into a mandatory code.

And I think that process of market development transformation is just -- makes all the sense in the world and I think the two agencies work and really complement one another very well in that respect.

I wanted to thank you and the team over there at the Efficiency Division for working on the Walls and Attics and providing the resources to push the marketplace and help provide resources for getting that done in practice.

I think we -- during the course of the 2016 staff here at the Energy Commission realized how important that was and really saw the need to get the Walls and Attics into the conversation more deeply.

And at the same time we're providing flexibility and various pathways for the builders. Really the long-term getting the industry to accept and learn how to build advanced walls and attics and the pathways that are really going to get those efficiency gains is an iterative process. It really does depend on having a marketplace be able to not accept all of the risk from the outset and I think those programs really help push that market. So thanks for that.

I know we had a lot of interactions across the agencies to make that happen in the timeframes that we operate under, so thank you for that

Also, just the leveraging of Prop 39 and working on some of those buildings, I think the utilities rightly saw that opportunity to again shake hands with the Prop 39 Program. And it's always a challenge, I think, to interface with a statutorily enabled program like that and sort of figure out how to work around any constraints that appear in the statute. And so I think you all have done a really good job of kind of leveraging that and providing some additional impetus in the right ways.

And also, I just want to congratulate you on the website, because I feel like we thought about sort of okay what should we do on the code front, because we need a lot of interaction with stakeholders on how we're going to get to ZNE code. And looked around and I think we found that we didn't really want to reinvent the wheel, because you guys already had most of the information up there.

So we're going to actually, I think, provide links or maybe co-branding. We have to talk with you all about that, but it's sort of a figure out how to present a broad unified front that aims people at all the same information no matter where they get on board.

And then I also wanted to point out that in the 758 Action Plan we have an initiative proposed that largely relies on the Division of State Architect to do some development of schools toward ZNE. And so that's something -- I'm not sure if you are all aware of that, but I think that's pretty interesting that it came from the DSA. And we were happy to support it. And it's new, not necessarily retrofit, but it was important enough we thought it should go in this 758 Action Plan.

And so I think having the DSA on board I think is terrific and showing some creativity and some initiative there. So that's another area we could work together.

And then I have one question. On the modeling

front, so absolutely see the overestimation of savings as an ongoing problem. I think we -- and for purposes of code there's sort of a new game in town kind about how we're going to model and we think we have a better widget or a better mousetrap or whatever you want to with the CBECC, whatever you want to call it -- the CBECC0-Res and CBECC-Com.

And I guess I'm wondering what tools you might be talking about and whether the new modeling regimes in the code environment might solve many, if not all of those problems of sort of inaccuracy or overestimation of savings?

MS. FOGEL: Right.

COMMISSIONER MCALLISTER: I think Martha probably can have this interaction more with you, because she was really involved in that. But I guess I'm wondering what tools you're talking about that the utilities would be helping people --

MS. FOGEL: Yeah, I'm blanking at the moment. Which tool is it, the non-res tool? Yeah, it's eQuest, yeah, thanks. So they currently use eQuest, so I think there are some opportunities there. I think LBNL (phonetic) has had a development of a new tool that we should be considering or some of the utilities have been considering as well.

So yeah, a chance for more conversations and we're having a call on that soon with the utilities, so I'll make sure Martha and others get invited to that. It'd be great.

COMMISSIONER MCALLISTER: Okay. Great, because the CBECC now is standardized around EnergyPlus.

MS. BROOK: For commercial buildings it's EnergyPlus.

MS. FOGEL: Right, yeah.

COMMISSIONER MCALLISTER: Yeah, for commercial.

MS. BROOK: Based on when you were talking about the slides and the period of time you were talking about, I would bet money that you were talking about DOE-2.2 based tools or DOE-2.1E based tools depending on whether the marketplace was using eQuest or EnergyPro for those Savings by Design calculations.

MS. FOGEL: Yeah, I'm pretty sure we require eQuest for calculations for those savings for Savings by Design. But I'm looking at Peter, who's not nodding at me. But okay --

COMMISSIONER MCALLISTER: Okay. Well, I guess I was just -- you know, I don't think we need to get into all the details here. But it would be good to have alignment about that, so that the tools that Savings by Design or other programs are requiring for participation in utility

programs actually do not require people to jump to another track to then actually get things through code.

MS. BROOK: Right, Right. And we are working with the Statewide Tools Group. They are trying to build off of the CBECC-Com platform to add functionality and features beyond the compliance set for CBECC-Com. They're starting with the health care industry I think, and then hopefully they'll expand into other areas.

COMMISSIONER MCALLISTER: Great, Okay.

All right, I don't have any other questions or anything.

MS. FOGEL: Any other questions, comments?

COMMISSIONER MCALLISTER: Anybody (indiscernible) Mazi?

MR. SHIRAKH: Mazi Shirakh, CEC staff. We heard from some commenters about the need to harmonize renewables with the Grid. Is this also using different strategies like SMRJ (phonetic) on the customer's side or utility side? Is this also a strategy that the CPUC is considering for the upcoming --

MS. FOGEL: Yeah, I mean at this point we're trying to study how different approaches to meeting ZNE might affect Grid costs, distribution system upgrade costs, and Grid functioning. So we're in the very early stages, but as I mentioned we want to try and assess how,

for instance, just requiring onsite solar for ZNE might differ in their impacts from a requirement that's onsite solar plus storage that might differ in impacts that's distribution system-tied renewable energy.

So we know that not all buildings can achieve ZNE just through onsite renewables. And again, we have this strong push towards optimizing the deployment of renewables and other DR storage etcetera -- optimizing the deployment on our Grid from the Legislature. So we want to -- we're definitely studying all these issues and talking about it. It's in pretty early days, yeah.

MR. SHIRAKH: Thank you, Cathy.

COMMISSIONER MCALLISTER: Yeah, I did actually have one other thing I wanted to say, so maybe one question. Have you engaged in this natural gas, electricity tradeoff question at all? It's a sticky one and so I'm okay if the answer is no, but I guess it does seem like something we have to figure out what our policy is at some point here pretty soon.

And it's sort of overdue, so I wonder if you all are thinking about that or if you're kind of engaged with that issue yet?

MS. FOGEL: Yeah, it's funny. On the train up here I was thinking, "You know, I know we're doing that, but I'm not quite sure what we're doing." So yeah, it is

something that we've started to look at, particularly with the Governor's announcement of the 2030 Goals. I know Pete Skala, our manager of the branch, has looked at it and there's some internal discussions.

We currently have a very restrictive policy on how incentives can be used to fund fuel switching from natural gas to electricity. So I believe -- I can get back to you on this, but I believe actually that issue may be included in our current phase of efficiency proceeding. And if it's not this phase it's probably the next phase, just to reassess that policy and approach towards incentives.

COMMISSIONER MCALLISTER: And it seems like also -- I mean, at the moment it's actually illegal to size a solar system to even do that right, because you're not supposed to size it past your onsite electricity load, right?

MS. FOGEL: Right, and so it's actually that CSI Incentives were only available for right-sized solar systems. CSI Incentives are mostly gone now.

COMMISSIONER MCALLISTER: Yeah, okay.

MS. FOGEL: But for the Net Energy Metering you can oversize theoretically, but you can then only access the lower wholesale cost for a repayment effort back to the customer of the energy they're providing. So it's

definitely not economically ideal to be over-sizing your solar systems to offset natural gas.

And I think you mentioned the cost effectiveness issue earlier. And we see this as a pretty big undefined, unclosed discussion about all these interactions and what really will be able to be found cost-effective when we assess future grid functioning.

COMMISSIONER MCALLISTER: And this may actually change with Net Metering Reform too, right.

MS. FOGEL: Absolutely, yes.

COMMISSIONER MCALLISTER: Depending on fixed charges and time of delivery and all that kind of stuff, right?

MS. FOGEL: Yeah. Yeah, that will impact things, for sure. I mean, I think I'd let Martha and others speak to how to important NEM is to the TDV calcs, but I'm told it's a significant change. Certainly for an individual building owner beyond what assessed through Title 24 TDVs average.

COMMISSIONER MCALLISTER: Okay, great. And I'll just say finally, having been in the last few months down at the KB Homes and at the Meritage Project that you referred to -- quite impressive what some of the builders are doing. I mean, it's really hopeful, fingers crossed, that consumers feel the same way and really want to buy

these buildings.

There's a technology component of this, I think, that's really important apart from the ZNE or low-energy or even the environment aspect of a new home, generally. But it comes with wiz-bang technology that people also like. So it really depends on what the consumer is looking for and how well that overlaps or not with ZNE-type characteristics.

But the Smart Grid interaction that they're doing at that Meritage Project down in SoCal with battery placement and looking at different dispatch models that they might use for the localized batteries, comparing different models and the deployment of technology.

I increasingly see this as not a technology issue, but really as kind of a regulatory structure in part issue enabling the right solutions and figuring out what's economic and sort of where we're going in the grid in the future. But this electrification question is really shaping up to be a key one.

MS. FOGEL: Yeah, we need to move to grid-optimized buildings, we think. And there are some -- that great experiment -- John Morton down at Edison is trying to get going -- another ZNE community. Conrad Asper and Peter Turnbull, for PG&E are lining up about six new VNE-specific pilot homes with new builders, which is great. And

hopefully we can get some of those to expand to the subdivisions level, which is really where we can test some of these broader grid interactions yeah, and see what works. Thank you.

COMMISSIONER MCALLISTER: I eventually want some recognition for my house, because it turns out I can only get a -- a 3 kW system is probably going to more than max me out and this is a 1990 vintage building. So am I one of those people who craves the label on my door; I don't know?

MS. FOGEL: Recognition for them.

COMMISSIONER MCALLISTER: Maybe there's a program. I haven't done it, thinking that was the case, but maybe there's that upside, who knows? Anyways, thanks a lot.

MS. FOGEL: Yeah, great.

MS. RAITT: Great, so now we're ready to move on to the ZNE Metrics Panel that Martha Brook will moderate from the Energy Commission.

MS. BROOK: Hi. I'm Martha Brook and I'm glad to be here and I think we have a great Panel.

So what we're going to talk about is ZNE Metrics, because as I think we all know, there's different things floating around and actually getting implemented in the marketplace. And they haven't all used the ZNE Code Building Metric. And so we want to talk about the

realities in the marketplace in terms of decision-making for ZNE-related buildings. And also just wanted to note that I think it's -- the second time that Zero Net Energy was ever discussed in a policy document was in the AB 32 Scoping Report for Greenhouse Gas Reductions. So I think it's very much seen as a Greenhouse Reduction Strategy. And therefore why aren't we talking about Zero Net Carbon?

And we do have Dave Mehl here from the Air Resources Board. And he's going to be talking about Zero Net Carbon. We also have Ralph DiNola here from the New Buildings institute. And he's going to talk to us about ZNE Metrics that have been adopted by the marketplace for real buildings that have committed to an aggressive, high-performance building metric.

And then finally, we'll have Jason Caudle and Chuen Ng -- I apologize if I have butchered you names -- from the City of Lancaster. And they're going to be talking about the decision making behind their mandate that all new homes install PV on the home.

But first I'm going to talk a little bit more about Time Dependent Valuation, TDV, and kind of queue up, or re-queue up that conflict right between gas and electricity specifically in Title 24, in code.

So there is a one-pager on the table back there, but I'm not going to bring it up on the slide deck. I'll

wind up talking about everything for those of you online so you'll know what I'm talking about.

But basically, Time Dependent Valuation is an energy-cost value. It's the average consumer cost of energy over the lifetime of the building. And this isn't made up by Commission staff, because we think it's kind of cool. It's actually a mandate in law that we consider the life-cycle cost over the life of the building and that they are consumer costs.

So I think Time Dependent Valuation has sort of been -- some people call it a social cost. It's really not a social cost. It's the consumer cost of energy. And potentially we wouldn't have these policy conflicts if it was a social cost. So I think we'll end up talking about that.

So for electricity, the things that we value in that Time Dependent Valuation are the transmission and distribution costs, the capacity costs, the emission costs, the ancillary services costs, the costs due to losses of electricity over the transmission and distribution system. The energy costs, the cost to actually generate electricity at the power plant and then the pretty substantial retail adjustment. So the utilities aren't in business to give away electricity, so the retail adjustment accounts for the fact that to really try to match the average consumer cost.

So we have a different retail adjustment for Commercial TDV and separately for Residential TDV.

On the natural gas side, we look at the transmission and distribution costs of natural gas, the emission costs, the commodity costs of natural gas and again the retail adjustment for the consumer.

The second big point, and this has been true for a very long time, is of those consumer costs electricity is almost four times as expensive as gas when you value all those components together. So the minimum difference between electricity and gas is about 3 to 1. The maximum, if you're looking at those high electricity costs is over 80. So a very small number hours of the year electricity is extremely expensive compared to gas, but on average it's about four time as expensive.

And so this means in Title 24 decision-making that we sort of do have that policy conflict with the electrification of buildings, because we have to make decisions over the life of the building that protect the consumer in terms of the cost of energy. And so until those emission costs, in the bundle of costs that we capture in Time Dependent Valuation are significantly higher than they are today, we will continue to have that differential between electricity costs and gas costs.

So, and this is important, because -- well, I

just wanted to clarify that again, because we are not taking a snapshot of today's grid, but we are also looking at that pretty renewable grid, 30 years out that has reduced emissions. So it reduced emission costs. We're including all of that in our time dependent valuation. And so even a very renewable grid, we expect to still be relatively expensive.

And I think that's really the challenge. We're not talking carbon, and we're not talking about energy, we're talking about energy costs in our Building Energy Code. So that's one ZNE Metric. And that's all I wanted to say in addition to what Farakh, already said about Time Dependent Valuation that we use in building codes.

And now I wanted to invite Dave Mehl to speak about the Air Resources Board's Zero Net Carbon Metric.

MR. MEHL: Okay. Well, first I'll start off by giving an example that we actually support the Zero Net Energy. And we're looking into building a new laboratory facility in Southern California. And we would like that to be Zero Net Energy.

So we're looking at what would it take for us to do Zero Net Energy when we look at electricity, plug loads, plugging in of hybrid or pure electric vehicles at the facility, the gaseous and liquid fuels used actually in the testing of engines and such? So we're looking at full

energy associated with operation of the building, because we think being the Air Board it's a responsibility for us to look into of what would that take? What's the cost effectiveness? We really want to do a full evaluation of this.

And so that's our starting place on we support Zero Net Energy, but we support it in getting down our carbon emissions. That's our ultimate goal, as the Air Board, is to reduce the carbon impacts of new buildings so that we can achieve the long-term greenhouse gas goals of 80 percent below 1990 levels by 2050.

And so what we want to do is we think this is a good pathway forward. There are issues that are going to need to be resolved such as cost effectiveness. The grid is going to be modified. There's measures right now to modify the natural gas system by bringing in renewable natural gas, methane, from bio sources. We support that. We support reducing the greenhouse gas intensity of waste and water. And how do all of these incorporate into new facilities?

There's a lot of moving parts, a lot of dynamics that are going to be evolving over the next 30 years. You know, renewables, integration of storage. How is that going to impact and what would the need for onsite generation would be with this ever-evolving grid? That's

something that we're going to need to work with: stakeholders that are utilities, the energy agencies, home builders. Everybody is going to have a role to play in this long term progress that we are striving for.

COMMISSIONER MCALLISTER: Let me just jump in here real quick. Sir, I want to think you for being here. And certainly the Air Board is a key partner in all of this. I mean many of the discussions now are with the two energy agencies: the Air Board and the ISO. And the four agencies have been sponsoring this pathways work trying to get a handle on these long-term carbon scenarios.

And Mary and the Air Board have really been instrumental in driving much of that work. And I want to thank you and her for that.

So part of the output -- really a key output of that pathways work has been just highlighting the fact that really that combustion not only in our power plants, but as an area source -- you know, lots of hot water heaters and HVAC units across the land -- when you count those molecules long term they are important. And we have to have scenarios that avoid non-renewable combustion emissions.

And so one big question I have is how big the biogas opportunity actually is? How much of our existing combustion would we be able to really offset with biogas?

And I don't know the answer to that question.

The other key is how viable are the non-combustion technologies: electrification of HVAC and heat pumps, etcetera? How viable are those going to be from a cost effectiveness perspective assuming that technically they're pretty much there and it's a matter of kind of getting the cost down?

So this is why I think this is a pretty sticky question, because we have this existing natural gas infrastructure structure, lots of investment. There are a lot of reasons why we want it maintained and improved and in many cases replaced. And that's a big forward investment that is being contemplated actively right now.

At the same time we're moving towards a low-carbon grid on the electric side. So the carbon metric, pretty quickly, starts to look very different from a cost-effective metric, as Martha was saying. And those really are policy decisions that we've to make in the near term, so that we can direct investment going forward in the long term.

And I think that's really where all of us want to get a better understanding and work together across the agencies to figure out where we're going to go.

And that the Governor, I think, cleaning up heating fuels -- you know, the third goal -- that's what he

was talking about is getting a handle on both the biogas and the electrification in trying to figure out how we're going to move our heating needs to be less carbon intensive. And how those two possibilities are going to pan out, relative one to the other, I think is a really big question we need to get handle on.

Anyway, so I just wanted to provide a little more context for the carbon discussion, because it is a really -- it's a fairly bright difference between the cost-effectiveness sort of in the traditional ways and the new kind of carbon metric that we're evolving towards.

So thanks for being here again.

MR. MEHL: Well, thanks. And I'd like to say we're right now developing a short-lived Climate Pollutant Plan, which has an overlap with the traditional Scoping Plan Update for Methane. So the natural gas pipeline and what do we do with that to reduce fugitive emissions as well as direct emissions from the processing of natural gas, so we have that methane element in the short-lived. We're going to have our initial workshop on the next week on the 27th to discuss the concepts of what do we want to do with these things?

We're also going to be needing to start the next Scoping Plan discussions very soon to develop pathways forward to meeting our 2030 goal that the Governor has set

forth. So there's going to be a lot of discussions going on. And one of the key areas is what research is needed to further our knowledge, so we can make good policy decisions.

COMMISSIONER MCALLISTER: Thanks.

MR. DINOLA: I'm Ralph DiNola. I'm the CEO at New Buildings Institute. We're actually a California nonprofit based in the Pacific Northwest. And thank you to the Commission for having me here today and Martha for inviting me on the panel.

So I want to provide more of a national perspective of what's going on with ZNE and maybe get past that and talk about some of our research. So at New Buildings Institute, we focus on research. We actually develop codes and policy and we also develop tools and guidebooks.

And back in 2012 we did our first national survey of Zero Net Energy buildings. We updated it in 2014 and then did a recent update in 2015. And this is all based upon a registry that we have and we've built a database of projects nationally. It's the largest database of Zero Net Energy buildings in the U.S. It's focused on commercial buildings, so it's nonres for our survey.

And what we find is that 40 states and the District of Columbia have Zero Net Energy buildings. And I

will note that Cathy's numbers vary from our numbers in terms of California, but we do have our California ZNE Watch List that people can look at on our website. And so we have this kind of interim count, 2015, of 191 buildings, 39 are verified, and then we have our category of ZNE emerging and ultra-low energy buildings.

We've been a facilitator of this Pacific Coast effort focused on -- we actually helped to get the Net Zero buildings requirement or goal into the Action Plan. And we're excited to support that effort. We helped to facilitate the comments that Cathy talked about to DOE. And so we're really hopeful that we're going to see alignment.

So the whole idea of the Pacific Coast Collaborative is really to bring alignment between California, Oregon, Washington and British Columbia. And certainly, California being a significant part of that group is helping to inform the direction. But what's exciting to see is that when you look across the Pacific Coast Collaborative you see a pretty consistent approach to trying to achieve the 2030 goals of Zero Net Energy buildings by 2030.

So there are many definitions out there. The one that we've been using is basically saying that a Zero Net Energy building is one that greatly reduces energy load,

such that over the year 100 percent of the building's energy use can be met with onsite renewable technologies.

And so we have a very simple equation. Basically, take the building's total energy use and EUI minus the onsite production and you get the net amount. Also Architecture at Zero, which is again a California-based initiative is really focusing on this site-based or looking at community-based renewables as well.

So we have a set of definitions. As I was sharing before the Zero Net Energy verified, and this is a building or a district or a community scale, ZNE Emerging is one that has targeted achievement, but has not actually documented and had a third-party verification of performance.

And then this ultra-low category you could also call maybe ZNE Ready. These are low-energy buildings that could eventually achieve ZNE.

So again we're tracking a whole set of definitions and how those are measured. And so we've been tracking these over time. You know, again I think California -- to my knowledge California is the only jurisdiction that does time-dependent evaluation. And I think that that's unique in the U.S. I think it's good to have that perspective, because I think what we're seeing in other markets is just this simple definition does not

really take into account what's happening with grid energy sources. And that could be considered a concern.

Other jurisdictions, Massachusetts is basically focusing on this. A definition of ZNE Site versus ZNE Source, ZNE Cost versus ZNE Emissions, and so again I think there's a lot of various ways of measuring achievement.

CARB, California Air Resources Board, really I think pushing the envelope and really maybe the future to talk about Zero Net carbon buildings. And so I think that this is a great thing to be thinking about as we move into the future.

Also recognition in California that different building types are going to have an easier time or more challenging time achieving ZNE and so looking at building types over climate zone, over time, I think this is a really interesting way of diagramming the achievement of ZNE in California.

And, you know, looking at the code changes that are coming and then when those building types could fall into line on achieving Zero Net Energy over time. So I think it's good to have this more kind of detailed perspective about looking at market segments and building typologies.

So we've been looking, as part of our work with the California Public Utilities Commission, we have been

looking at developing the recognition criteria. So the technical criteria for evaluating a project for recognition with a program. And so we've actually gone through and looked at basically what I would consider a Standards Review to look at what other organizations are using for technical criteria for achievement.

So we have Architecture at Zero. Earth Advantage has a classification. GreenPoint Rated has a classification leading to zeros, it's another commercial program and then the Zero Net Energy Building Certification from the International Living Future Institute among others. I couldn't fit the whole list on this slide.

But looking at the definition they're using and then how they're measuring energy consumed, energy produced, what the performance period is. And then there's a lot of consistency and we're coming to and we're just kind of working on a draft of our technical criteria.

I did want to show just a couple of examples of how this happens quite often on the ground. And this is an example of a Zero Net Energy building that was certified, a living building. And I think this is really interesting to see. It is a very simple calculation if you're just looking at Site Net Energy to basically say here's the modeled or anticipated monthly energy consumption and production. And here's the actual metered utility

information or metered renewable energy information. And then on a simple spreadsheet you just keep track of it and then you see how you're doing.

It is important to track this monthly. And so what we see is projects doing this sort of thing where they're looking at their predicted or modeled savings or consumption. And then how that's happening over time. And so then hopefully in the end you're going to achieve Zero Net Energy or actually positive energy production.

And another example, and really just understanding that there's many buildings are complex and really just understanding that many buildings are complex. In this case this was a building that was actually using pumps to supply other facilities, so those had to be factored in, but using simple spreadsheets to identify consumption production and then the net savings. So we've come together taking the technical criteria and project experience that we've seen to start to develop the recognition program criteria.

And so again looking at providing general building information, the occupancy is really important. So have you achieved the occupancy rate that was anticipated for the building? And that's something one needs to be considering. A building that is not fully occupied according to what was modeled can be challenging

to document actual consumption and use.

Also schedules, I think are really key, so you model a certain schedule for building operations. And the actual schedule may vary.

Then we have consumption at the site, production or generation at the site, what are the renewables, what's the location of the renewables and things like that. So this is a draft of what we're starting to look at for our technical criteria for recognition.

So this is again, ongoing work and TRC is actually doing some work right now on ZNE Metrics and this is a larger study than we're doing right now for the recognition program to look at how this could impact code. And so I just want to point out, and I appreciate TRC providing these slides, there is the issue of design versus performance and we need to be thinking about that -- the actual or outcome-based energy performance.

And in the timeframe, what is the period of time that we want to document? Is it one year, is it ongoing, is it more than one year? You know, we have to compare to that model performance.

And then the energy types: electricity, gas, the discussion that we were just having.

And then the human factors of occupancy. And I think we could add into this unregulated loads and plug

loads and how do we even anticipate those with a model facility.

So we know that there's this TDV in California and then there's kind of the market approach, which is kind of voluntary. And I think what we're finding is that people are using these different approaches whether it's energy cost or actual energy performance. And at this point I think it's really an open field and I think that it's an evolving field in terms of definitions. But I think there's a lot of interest around this and I think over the next couple of years we're going to see a lot playing out with how DOE responds to comments and how you move forward with your code revisions.

And I would like to just point something out. You know, there really is no such thing as zero. And so either you're consuming more than you're producing or the other way around, which actually causes a conundrum, because in this calculation negative is really positive. So I think that's something else we need to be thinking about when we're talking about zero.

And NBI along with Charles Eley developed the zEPI Scale and we really think that compared some of the standards out there for measuring performance, this is a more absolute approach compared to, for instance, ENERGY STAR Portfolio Manager, basically setting the bar at

CBECC's 2003. And then zero as the target, so you can measure any building and any type against this scale. And this is something that we would like to see become more of a norm nationally.

So Cathy already shared about these resources, so we do encourage you to have a look at the resources that we have on our website. And I thank you for your time.

COMMISSIONER MCALLISTER: Thanks, Ralph. Thanks for all the great work you guys do, it's a pleasure.

MS. BROOK: Yeah, thanks. And we'll save questions until after our last panel and that is City of Lancaster who are presenting online, I think.

MR. CAUDLE: Yes, good morning, this is Jason Caudle and Chuen Ng from the City of Lancaster.

To give you kind of a start for at least a lay of the groundwork we're obviously a city government in the sense that we have a mayor who has taken a strong position on the value of Net Zero and the value or the impact of global warming, and has really set it as a goal.

And I think what's unique about Lancaster is that most cities don't see this as their role. And I think that's probably some of the challenge that we face as cities and as a state, is that most cities look at it as somebody else's responsibility, because we're not in the energy business by nature or by law. So but in Lancaster

we've taken a different approach.

And as you'll see by the next slide that the standard is we require solar on every new home that is built. And I think we were the first in the state, and I think there's been a couple of others to follow since. When I get done Chuen will talk about the details of that and the success of that, but basically it will require in a residential neighborhood that 1.5 kilowatts be placed on average on every new home. So I mean in theory, you could put three on one house and none on the other. And as we'll talk about later, that we haven't seen that impact -- that we generally see that every house has solar on it.

The requirement for this, and I think that it's unique in the sense that we had a mayor that was aggressive in saying, "We're going to mandate it." And the reality is, is that mandate nobody really opposed. The developers agreed. The marketplace has reacted well. And the reality is that at the magnitude of that decision, it's the leadership that said, "This is important to us and we're going to make this happen." And we did and we still have not had any negative feedback from the citizens, from the CEC, from the CPUC, from anybody as relates to the decision we made.

And I guess our mayor does a great job of kind of telling the story of what this means. And his comment was,

"We require people to put shutters on their house. We require people to put in front landscape. We require people to put garage doors as a local entity in our building codes. We require all these things, why is it such a stretch that we require them to put a solar panel on the roof?" And that really sums it up. This is not a difficult decision. It's a financially better position. It's an environmentally better position. And we put all these requirements on them anyway, so why not just add this requirement as well?

So it really is able to narrow down the impacts of the decisions we're talking about. It saves our citizens money. They finance it at the purchase of their house. It's easier to install. There's no argument. There's no debate. It's just that becomes the paradigm.

Now, as we talk about the implementation of that and the effect of that I'll turn it over to Chuen to talk about that. But we have seen unbelievable success. And I think generally statewide, if we had -- every one of our cities had this mandate, we'd have a whole lot different looking Grid and a whole lot different looking impact from an environmental perspective and a Net Zero perspective.

So with that I'll turn it over to Chuen.

MR. NG: This is Chuen, City of Lancaster. So with the Mayor's and the Council's leadership there was

still a lot of homework to be done on the staff level. On staff level we had to create an ordinance that would be feasible both politically and technically. And as we found out towards the end, you know, it needed to meet some regulatory standards.

Part of the homework is coming up with a threshold that's attainable. And this requires some outreach to stakeholders, the Building Industry Association, our local builders, the Association of Realtors and we had to consult with our Planning Commission and to just engage their take on it.

As we were drafting this we decided on a range of kWs dependent on where it's located in the zone. Most of our residential zones it is a minimum of 7,000 square feet, about quarter-acre lots.

And a requirement for solar on a house, on R-7000 is 1.0 going up to 1.5. We found that this was attainable, because one, your minimum size for solar, for PV, is about 1.4. And our builders have been putting in systems that are a minimum 1.4, now minimum 1.8. We believe that because the builders have been offering this as an option, and slowly moving towards offering this as a standard feature, that this was an attainable goal.

So, you know, the other thing is some of this may not be as scientific as you might anticipate. It's a

combination of different factors. It's whether this will be acceptable for a building community. And as Jason mentioned, they really haven't pushed back. They initially voices some minor concerns with our Planning Commission. But because this was something that they were already doing on a voluntary basis they didn't push back all that much.

We had to do a cost-effectiveness study and this was reviewed by the Energy Commission. We relied heavily on the Energy Commission's Report and kind of tailored it to our specific area. We determined that the requirement for solar was indeed cost-effective in both average consumer savings and market segmented savings analyses. This is due to the decline in costs for solar PV and for our location in Climate Zone 14. And this is certainly an area that is conducive to solar.

So we've had this ordinance in place since January 2014, so we do have some results around about 16 months of implementation. Every new home that's built in Lancaster has a solar energy system of a minimum of 1.8 kW. In many instances the systems that are installed on these homes far exceed the minimum threshold, because the buyers ask for larger systems.

But all of our builders have complied. For KB, our largest builder, it was fairly easy. But even our smaller builders have complied. They were not used to it,

because they were building homes without solar, but since 2014 they complied. And I think they're just getting used to it. And they're realizing that the buyers want them. Not just that, but this is a feature that separates new homes from re-sales.

So despite the flexibility in our ordinance to meet a minimum average everyone has complied. And all new homes have a solar energy system. So if anything in hindsight we could probably at some point in the future strengthen the standard, because the results have far exceeded what our ordinance requires.

And with that, you know, we're open to any question you may have.

MS. BROOK: Thank you, very much.

Andrew, do you have any questions?

COMMISSIONER MCALLISTER: I want to just say wow to what you're doing there and ask, what portion of systems do you think are going in or do you know that are going in that are larger than the minimum? You said there were a significant number. I'm kind of wondering what the specific portion might be?

MR. NG: We see a lot of -- I don't have exact numbers at this point, but we have a lot of systems coming in above 3, in a 3 to 4 range. The standard that most builders offer is the 1.8, but we see a lot of them option

up to systems above 3 and 4.

COMMISSIONER MCALLISTER: Interesting. Thanks, a lot. I really appreciate the leadership of the City and the Mayor for sure. Thanks for being here today.

MS. BROOK: This is Martha. I have a question. I'm wondering if you -- I'm guessing maybe it's a little too early, but have you been able to assess whether or not those new homes have been more expensive in the marketplace or have they actually been able to incorporate the PV into the typical sales price of a new home in the general region that Lancaster resides in?

MR. CAUDLE: Right, this is Jason. We've had this conversation on a number of different fronts as it relates to having values, because we're having a broader conversation locally.

But we don't necessarily believe that housing prices are indicative of the cost of the home. So what happens is when you're willing to buy a home based on the supply and demand factor and the market conditions, the same house that's built frankly in Lancaster for $250,000 is build in Santa Clarita for $400,000 or sold for it. So it's an issue of supply and demand.

Adding a solar panel on the roof doesn't necessarily -- in the story that we're telling it does increase the cost of the house, but it decreases your cost

of operation. And that's the real story that needs to be told, is that many people look at this and say, "Oh, it's an extra $5,000 on the house." But it's also $100 less a month on your electric bill or there's some story. And that's what the developers have really done a good job of telling that story.

And that's why the Mayor sees it as a no brainer is that you citizens save money with this. So as much as the house price -- the house isn't going to change, because it's on a market-driven factor at the end of the day your electric bill is going to be cheaper.

COMMISSIONER MCALLISTER: Hey, Jason thanks. I really appreciate that answer.

I guess, I'm wondering if you see broad adoption of that messaging say with assessors or the real estate industry more broadly. I mean, the mortgage industry. Do you find sort of the service providers around home purchasing understanding that out-of-pocket cash flow issue is actually important for them in their business to understand. In terms of hey, if this person has a lower energy bill going forward they're actually going to be more likely to make their mortgage payment or those sorts of issues of risk?

MR. CAUDLE: I don't know that it's been institutionalized. I think that's one of the challenges,

frankly, to implementation, is that if this drives up the cost of the house then it's going to push out some buyers that may not qualify for that house. But there needs to be something that institutionalizes the value of solar.

MR. NG: You know, anecdotally I've heard that they have more concerns about the ones that are leased versus the ones that are purchased outright. So with anything with new homes this comes with the house that's already paid for. The appraisal community, I think they're getting used to it, because all of our new homes have solar on them. So for the past three years, they've had to do appraisals with this as part of the house.

COMMISSIONER MCALLISTER: And those appraisers presumably also appraise houses outside of Lancaster, I would imagine. So maybe there's a little study to be done there to look at maybe there's some differences that can be detectable in the whole region with Lancaster and other cities around them.

MS. BROOK: Great, thank you.

So I think we should open it up to the room here to see if anybody has any questions for anybody on our panel or anything you've heard today?

MS. RAITT: Or did you want to wait until the end of the day?

MS. BROOK: Oh, sorry.

MS. RAITT: Or no, go ahead either way. Just I know we're running late and I thought we were taking public comments at the end of the day.

MS. BROOK: Oh, okay. Never mind.

COMMISSIONER MCALLISTER: I guess I'm interested -- just to slow us down even more, sorry -- to know, so you mentioned that some of these new houses are being bought by investors and then rented out immediately? Is that what I understood?

MR. NG: Are you speaking to Lancaster here?

COMMISSIONER MCALLISTER: Yes. Yes, I'm speaking to Lancaster.

MR. NG: The new homes are -- the investors, they go after re-sales. The new homes, my understanding or awareness is that they are purchased by buyers that live in them.

COMMISSIONER MCALLISTER: That live in them, okay. I'm sorry, I misunderstood what you said before then. I was thinking that the issue for -- that this issue of mandatory solar was affecting investors in some way, so I think I misunderstood that. Thanks for the clarification.

MS. RAITT: Okay. Well, then I thank this panel very much. And if we could go ahead and ask our next panel to come up to the tables we'll go ahead and just take a

moment to rearrange the room a bit here.

So Bob Raymer, Greg Mahoney, Karly Silicani, Sue -- and I'm not going to try to pronounce your last name -- Manuel Alvarez and Obadiah, please sit at the tables.

(Break: Room set up for new panel.)

MS. RAITT: Okay. So we'll get started again. Thanks, everybody.

Our first speaker is Rob Raymer, excuse me, Bob Raymer from the California Building Industry Association.

MR. RAYMER: Thank you, Commissioner and others. I'm Bob Raymer with the California Building Industry Association.

And before I get into my presentation today, which is going to focus on the onsite versus offsite issue, just like to say as we left off with the last panel you had mentioned assessors and the key role they could play? That would be a game changer. We've known that for several years. We are still the point of tearing the hair out where you've got builders, large companies integrating solar as a standard feature. And, you know, basically seeing these homes appraised at the same value as a similar sized home across the street with no solar whatsoever -- that has to stop. And it needs to stop quickly.

It's a tough thing to address. You don't just pass statutes saying, "You need to give value for this,"

but there obviously is value. So once again that could be an enormous game changer on this.

COMMISSIONER MCALLISTER: Thanks, Bob. I agree with you and I'm wondering if there's a little natural experiment going on in Lancaster environs where we could actually do the numbers and see if there's a detectable difference in the appraised values of those homes versus the ones next door?

MR. RAYMER: My gut feeling is yes, there is. And we've even seen this in Davis with that exact example. So with that, as Farakh mentioned this morning there -- we need to look at the offsite versus onsite issue in that there may be the need for an exceptions when you can't get enough solar, enough onsite energy to meet the ZNE Code definition.

I would like to take it a step further and suggest that this probably is going to be much more than just a simple exception. I'm feeling here given what we've seen in the last decade that while we can certainly meet a ZNE Code definition, that doing it onsite is probably going to be at best a 50-50 proposition, maybe even less for that. And hopefully in the next few minutes I can explain why.

Over the last 15 years single-family construction has gone vertical. And my apologies for those of you that

have heard this again and again, but this is going to be the same story. About 80 percent of our new single-family construction is going either two-story or in some cases for high-density infill is going three-story.

We are seeing the emergence of very high-density single-family construction where the homes are separated by no more than six feet. This is allowed through the California Residential Code, because all new homes in California go dating back to 2011 have to be equipped with fire-sprinkler systems on the inside, so one of the offsets for the fire sprinklers in these homes could be six feet across. It used to be three feet on each side of the property line. With the advent of the 2014 Code that is now just simply "forget about the property line, it's simply six feet between one dwelling and the next."

This problem is further exacerbated by the location of roofing vents throughout the reduced roofing area. And the need to provide minimum clear space for firefighter access alongside the solar panels installed on the roof.

And rather than just point out problems, I'd like to make suggested solution here. I think we can legitimately put forth the question now to the Fire Service as to why the fire fighter PV clear space along the side of the roof, and along the ridgeline, is required on homes

that are fully sprinklered?

When we put these standards together three to four years ago we were looking at the type of housing stock that existed in the mid-2000s. Very few of them were fully sprinklered and this is something that's changed. And so in support of Zero Net Energy I would think we're at a point now with our fire safety design of new homes that this clear space on new construction is not needed. You do not see a lot of need to penetrate the roof of a new home that's on fire, because quite frankly you'd rarely see a new home that's fully engulfed with fire.

Adding insult to injury from a project-wide basis most local jurisdictions will require project design requirements that either reduce or eliminate long straight-of-ways within the residential community -- that being the long east-to-west boulevard that you would see within the jurisdiction. You certainly see that in your arteries, but once you get into the jurisdiction you're going to see 90-degree turns. You're going to see cul-de-sacs, L-shaped streets, U-shaped streets.

This is done entirely for the purpose of physically reducing the ability to go more than 25 miles an hour. It's for the safety of the children, to try to promote a more residential atmosphere. And quite frankly most jurisdictions aren't going to let you put in a long

east-west facing street.

COMMISSIONER MCALLISTER: Hey, Bob?

MR. RAYMER: Sure.

COMMISSIONER MCALLISTER: Can I also ask about design characteristics of the homes themselves?

MR. RAYMER: Sure.

COMMISSIONER MCALLISTER: I've noticed builders prefer to put penetrations on the back side of the house instead of the street side of the house --

MR. RAYMER: They are now. They are now, yes.

COMMISSIONER MCALLISTER: So what happens if the backside of your house is facing south or a plane that you would want to put solar on?

MR. RAYMER: Well, one of things we're looking at now, actually we've got HCD (phonetic) here in the audience that's helping us out with this as well as the CEC staff. We're trying to sort of get the Energy Code and the Residential Code to work hand in hand. And I believe with this update to the California Residential Code there's a good chance that we're going to come up with at least one package that allows for the unvented roof.

This is in concert with the new high-performance attics that we're trying to implement where you effectively have sort of a peripheral venting of that attic area. And so the need for the venting that we've seen in years past

is not there. It also helps us get to a much cheaper level of that advanced attic system.

COMMISSIONER MCALLISTER: Great.

MR. RAYMER: And so while it's still an issue, I see that becoming less of an issue down the road. The problem here is all of this stuff seems to kind of work together to kind of make it more difficult to design, particularly going high-density vertical. That's the biggest problem.

And the other problem here is when you go high-density vertical that home, that single-story home that's about 20 percent of the market out there, is usually perched right between two taller homes. And that, in and of itself, is problematic.

Now, considering all of this and then understanding the average size that a single-family dwelling is going to need -- and this is where right now we're sort of at a disagreement with CEC and I guess PUC staff -- we're estimating given what we know for ZNE, that the average size of the system will be 7 to 8 kilowatts.

Well, quite frankly our analysis is based on the information we have at the time that was done two years ago. I'd like to say that we have virtually no expertise at all, no basis for using the CEC's tool that's going to be available for the Tier 1 and the Tier 2 options and the

Tier 3 option or whatever we're going to call it with the Green Building Regs. We need to get familiar with that ZNE Package Calculator, so we can understand what exactly the design constraints are going to be required for that ZNE Code home.

Once we get a good feel for that, you know, a lot of doors are going to be able to open up. And, you know, moving on why does the PV system have to be that size, I was a little surprised to see on the chart that was put up at the beginning that for a home being built in Climate Zones 11, 12, 13 and 15 -- well let's forget about 15 -- 11, 12 and 13 that you're going to be able to get by with a 5 to 6 kilowatt system. Like I said we were making estimates that it would probably be a 7 to 8. The reason for that, of course, was plug load and the gas usage.

Obviously, as we all know, about 55 to 65 percent of the homes total electrical load after the 2016 Standards are implemented is going to be related to the plug load. And that, of course, has to be taken into account when designing the PV system.

In addition, the CEC's definition of ZNE will require industry to account for a home's gas load. When calculating the PV size you put the two of these together and there's just no way that we felt a 3 to 4 kilowatt system was going to get you to ZNE.

Once again, all of this can change once we become familiar with these design tools.

Now, more importantly, the offsite solar who-what-when and where, all of this is going to require a great deal of cooperation between the home builder, the solar companies, the utilities, etcetera. There's a lot of issues: net metering, everything else that you can think of. All of these are still moving targets and that's not a good thing.

It would've been very helpful to have all of this answered three to four years ago, because from a code nerd perspective working with the building codes for many years the fact of it goes it's currently May of 2015, 2020 from a code perspective is right around the corner. And so we need to be able to -- as an industry we need to be able to number one, understand what it's going to take to comply and more importantly. And more importantly we're going to have to be able to explain to the potential home buyer why this is here and more importantly, you are going to get your money back.

You know, for the past 35 years a key way -- a key mechanism we have used to sell the changes that new standards have brought about has always been, "Eventually, you're going to get your money back." We don't necessarily tell them it's going to be in year 29 of a 30-year package.

But it's nice to be able to look at them and say, "This is cost-effective." And so that's one of the thing that we're going to have to deal with.

Obviously, in terms of tools and mechanisms out there something similar to a Mello-Roos type of a funding mechanism where -- you know, for the things that you can't necessarily get into the 30-year mortgage to have other options that are out there, community-wide systems and whatnot, systems that remotely located in another jurisdiction, but in the same climate zone and in the same utility zone. All of this needs to get worked out very quickly with the utilities. They need to be kept whole.

At the same time we need to have these answers, like I said, yesterday. And so with that I realize I've kind of already gone over time. And so maybe at the end of this we can discuss cost, which is also a small issue to us, but with that thank you.

COMMISSIONER MCALLISTER: Just a little. Thanks, Bob.

MS. RAITT: Okay. Next is Greg Mahoney.

MR. MAHONEY: Good morning. My name's Greg Mahoney. I'm the Building Official for the City of Davis and I'm representing CALBO. And I apologize, the handout that you got, I sent the wrong file this morning. I have the correct one up here now.

I also apologize for the less than positive attitude or message that I may be bringing, but I think it's important to address realities associated with implementation and enforcement.

So I'm not sure what the tracking mechanism is going to be for the building officials to keep track of offsite solar, but I just want to kind of identify some of the issues that we're faced with. So if we can go to the next slide?

I brought some slides I thought would just kind of set the stage for us. So, when I started my career in code enforcement, building code enforcement 27 years ago, these are the four code books that I had on my desk.

COMMISSIONER MCALLISTER: That's cute.

MR. MAHONEY: And those were half-sized binders, by the way. Those aren't the full-sized binders we see now. And if we can go to the next slide. This is what my desk looks like today. And so I just provide these photos, so that people understand that things have changed significantly over the past 25 years or so.

And if we can go to the next slide. We also, in addition to the codes -- during the last code cycle of 2010, we got two new code books that we've never had to read or know before: the Residential Code and California Green Building Standards Code.

In addition to that we have, you know, the CASP Program, Assembly Bill 2188 where we're required to treat PV contractors in a preferential way.

They also have -- you know, many jurisdictions or building officials like myself are Flood Plain Administrators for their individual -- I also oversee code enforcement. You know, we're required to enforce the Substandard Housing Regulations. You know, vermin infestation and mold and all these things we really don't see as our core mission.

We have now Civil Code requirements that we have to enforce, Civil Code 1101 with Water Efficiency Regulations. We have a similar Assembly Bill that would require us to also treat EV contractors in a preferential way, CASP, all these things.

So what I'm trying to -- the message I'm trying to bring is that our plate is full. And I know that a lot of times well-intended organizations think that we should be able to measure the depth of mulch and verify whether there's overspray on irrigation systems and things like that. And they see it as only taking a few extra minutes while we're there.

But if we can go to the next slide, I guess the message that I want to send out there is absolutely CALBO is supportive of energy efficiency. We understand the

importance of that and we understand that it's something that we are tasked with ensuring and verifying. And it's something that we know needs to happen. But our bandwidth has been exceeded. Right now anything else that gets piled on our plate means that something's going to fall off.

We have a number of factors that affect that. Most of the cities are understaffed right now with the downturn in the economy. We cut our staffs, now things are picking up, but City Councils and Boards of Supervisors and City Managers are unwilling to bring people on, because they don't know how long it will last. And, you know, there's the real I guess possibility that we would have to lay them off. So we're operating with less than full staffs and we seem to be getting more and more responsibilities.

And in addition that, many of the people who have done this work in the past have retired. Eighty percent of the building inspectors now are over 50 and we're losing programs like Butte College who used to turn out building inspectors. We don't have qualified inspectors to come in and take the place of those who are retiring. I just hired two temp people and both of them have little or no building inspection experience, so we're starting from zero.

And so I guess, like I said, the message I wanted to send -- like it says "Additional responsibilities will

continue to compromise our care mission." And our core mission as stated here -- this is the CALBO's core mission -- "Promoting public health and safety in building construction through responsible legislation, education and building code development."

So we all understand the importance of energy efficiency. We also see health and safety as our core mission and right now it seems like there are a lot of things that are being placed -- or we're having to accept more and more responsibilities.

And so if there is going to be any kind of tracking system it has to be something that's too onerous for us to deal with.

COMMISSIONER MCALLISTER: Well, you said apologies in advance for the negative tone. I actually was expecting much worse. But so not the first time I've heard those issues and they are absolutely real issues and, you know, I think part of why we're here today really. And not just in the ZNE context, but also more broadly in energy efficiency in existing buildings.

And there's some frustration on my part that there's sort of preferential treatment for certain sectors of the energy economy, the clean energy economy, may be pushing efficiency off the plat too. Because, you know, efficiency can be more complicated if it's -- it can be, I

think. It really requires you to stick your nose into the building much more deeply than maybe something next to the panel like a PV system or whatever.

So I think an integrated solution to this is something we'd really like to work towards. And bottom line, I know it means more resources to the local governments. You know, we're trying to do some of that with the 758 Action Plan to try to get some resources towards innovative local governments that can come up with more streamlined or better ways or more effective ways to work with their contracting community. And maybe do more with less in some ways, but also justify that they need more resources.

In any case, I don't know what the perfect solution is going to be, but I'm very sympathetic to your predicament being a resident of Davis now. And probably you'll be seeing an application for a permit on Friday, I think, for a PV system for my house.

MR. MAHONEY: We're closed on Friday.

COMMISSIONER MCALLISTER: Oh, no. My contractor didn't tell me that --

MR. MAHONEY: Cutbacks, cutbacks.

COMMISSIONER MCALLISTER: My contractor did not tell me that. I'll give him a heads up.

MR. MAHONEY: This Friday, we're closed every

other Friday.

COMMISSIONER MCALLISTER: Every other Friday, okay. Well, that throws a wrench in my works man, I'm sorry.

So let's see and I do -- and I mean, Davis's reputation as a jurisdiction that takes code compliance seriously is I think well known. And so I want to congratulate you on that and really I know you're doing a lot with not that many resources.

So anyway I guess what I'm saying is that those are not new issues, but I think creative thinking from everybody in the room and on the Web about how we might better attack some of these issues would be very, very welcome. Particularly from jurisdictions that are thinking hard about this and that sort of are making good faith efforts to do what's being asked of you. And seeing where the weaknesses are and where more resources would be most helpful from a state level or elsewhere.

So I appreciate your being here today and thanks a lot.

MR. MAHONEY: Sure.

MS. RAITT: Okay. The next speaker is Karly Silicani.

MS. SILICANI: All right, I'll be shifting gears a little bit from Building Codes to Community Solar. I am

the Product Manager at PG&E for our Solar Choice Programs, which are recently named Community Solar Programs.

On slide 2, I'll start with a brief history of the proceeding in April 2012 PG&E filed an application with the CPUC for the Green Tariff. A year later there was a settlement agreement with several parties changing what was proposed as a reg-based program to a steel-in-the-ground program.

In September 2013, Governor Brown signed SB 43 into law. So those of you who are familiar with this proceeding, this is a Green Tariff Shared Renewables Proceeding. You also may have heard our program referred to as the Green Option previously, so all three of those are the same thing that I will be speaking about today.

In December 2013, we filed testimony showing conformance with SB 43 and in January 2015 we received approval. There was a decision issued for the program. And we actually last week just filed three Tier 3 Implementation Advice Letters with regard to the customer: Site Implementation, the Marketing Implementation and the Procurement Implementation of our program.

So continuing on to slide 3 these shared renewable energy options, as I mentioned, our solar choice plans will allow our customers to purchase 100 percent solar power ensuring that new incremental solar resources

are developed. This is a pretty streamlined way to participate in renewables in that it requires minimal effort on behalf of the customer. And it also has no cost shift to non-participants.

Getting into the two options that comprise the solar choice plans, on slide 4, our PG&E bundled electric customers will be able to purchase electricity in one of two ways.

On the left-hand side of the slide, you'll see our Community Solar Choice Program. This is a program in which customers will be able to purchase electricity from a pool of solar resources within PG&E's service area. Again, for those of you involved or closer to the regulatory proceeding this was also referred to as a Green Tariff Shared Renewables Component.

And on the right hand side, you'll see the other option, which is what we're referring to now as a Local Solar Choice Program -- previously Enhanced Community Renewables. And through this program customers will be able to purchase solar energy through a single project sited locally within their community.

The cap for both programs is 272 megawatts, that's PG&E's portion of the state-wide cap. San Diego NSE (phonetic) also will be implementing these two programs as well.

Continuing on to slide 5 I'll start on the left-hand side, staying with our Community Solar Choice, in which customers purchase from a pool of solar projects. These resources will be half a megawatt to 20 megawatts in size, as I mentioned located within PG&E's service territory. A customer will be able to purchase or enroll in the program at either 50 or 100 percent of their electric usage. And the transaction will take place as a rate adder on the PG&E bill.

The local Solar Choice Program, in which customers can purchase solar energy from a single solar project, those projects will be half a megawatt to three megawatts in size, located within the same county or within 10 miles of the customer's service address.

The enrollment structure here is slightly different in that a customer can enroll through a developer. And this arrangement will be called a Customer-Developer Agreement and the customer can enroll up to 120 percent of their usage, which is an approximation to achieve 100 percent of a customer's annual load.

And the transaction, if you will, will take place is two different ways. It will take place, as I mentioned, with this Customer-Developer Agreement as well as the customer receiving a credit on their PG&E bill for their share of the share of the solar output from their

subscribed project.

For both programs, as I mentioned, these will serve PG&E bundled customers.

On the next slide, slide 6, our portion of the 600 megawatt state-wide cap is 272 megawatts, of which 45 megawatts are reserved for residential customers. Our legislative enrollment window is through 2019 or until the cap, the 272-megawatt cap, is reached whichever comes first. But once a customer enrolls, they'll be able to continue to participate on the program beyond this stage.

The program will be seeking Green-e Energy Certification similar to what SMUD's programs are also certified by Green-E Energy. This is the leading voluntary certification program for renewable energy.

On slide 7 I'll speak a little bit about the procurement. I noted briefly that these projects, both options, will result in incremental new solar resources in PG&E service territories. So in direct response to the customer enrollment PG&E will be signing long-term contracts for these new solar resources. And all of these resources will be above and beyond our RPS requirements.

There are a few special provisions as a result of SB 43 and the CPUC Decision. There's a 50-megawatt pre-procurement that will take place independent of customer enrollment. There is also a 20-megawatt reservation on the

procurement side for the City of Davis.

On slide 8 there are covered a couple of features specific to the Community Solar Choice Program. Again this is the program in which a customer can purchase from a pool of solar projects. The customer can receive deliveries from day one under this project. Prior to these new projects coming on line that were assigned in response to customer enrollment, customers will be served by PG&E's RPS Program. However those deliveries attributed to this program will no longer be counted to the RPS Program.

And in an effort to site these resources close to load, projects will be solicited in communities with the highest level of enrollment and elsewhere as demand warrants.

Lastly, on slide 9 I'll speak a little bit about our local Solar Choice Program. Again, this is a unique structure in that it involves three parties. The Customer-Developer Agreement allows the customers within the same county or ten miles of a project to contract for a share of the output of the project. PG&E will be signing long-term power purchase agreements with these projects and off-taking all energy from these projects, but paying for the unsubscribed energy only.

The developer has a signed payment for the subscribed portion of the energy to the customers, in which

the customers will receive a true credit on their bill, corresponding to the output of their subscribed solar portion of the project, which will be in the form of our EECR Tariff. And they will receive, again, this bill credit corresponding with the monthly output from the project.

So that's a very brief high-level overview of the two programs, but we, as I just mentioned, filed the Implementation Advice Letters last week. And pending the approval of those advice letters, we'll be looking to launch this program either later this year or in Q1 of 2016. So thank you.

COMMISSIONER MCALLISTER: A quick question, thanks for that. So it looks like both of those programs are attached to the customer? Or have you thought about an idea to attach those commitments to the building?

MS. SILICONI: The program, as it's currently structured is attached to the customer. I should note that it is open to both residential and non-residential customers. It is considered portable for the customer, once they've signed up, but it is not attached to the premise.

COMMISSIONER MCALLISTER: So as its currently designed it's not really incorporatable into code itself, because code is apart from the customer.

MS. SILICONI: Again, yes it's tied to the customer.

COMMISSIONER MCALLISTER: Okay. Great, thanks.

MR. RAYMER: Is this like a PPA that PG&E operates?

MS. SILICANI: So the procurement for these programs will take place through the REMAT, the Renewables Market Adjusting Tariff, which is an existing procurement mechanism as well the RAM, Renewables Auction Mechanism, which is another existing procurement mechanism.

MR. RAYMER: Thanks.

COMMISSIONER MCALLISTER: Go ahead, Cathy.

MS. FOGEL: I haven't followed this proceeding in depth, but I understand there will be a cost premium for these?

MS. SILICANI: Yes.

MS. FOGEL: I was wondering if you could speak to that a little bit?

MS. SILICANI: Absolutely. The cost premium for the Community Solar Choice Program, which is the pool of solar resources, it varies by customer class, but its roughly in the 2-to-e cents per kilowatt hour-range.

COMMISSIONER MCALLISTER: Above standard retail?

MS. SILICONI: Correct. And it functions as a rate adder. The rate structure is such that the customer

will purchase the solar energy, pay the indifference charges and be credited the standard class average generation adjustment, which again, varies by customer class, but ranges between 2-to-3cents per kilowatt hour. We've just named these, so I apologize, I'm going back to the regulatory names -- of Enhanced Community Renewables names or the program, which we're now calling the Local Solar Choice Program, will again vary by customer class. But again we're looking about a 7-to-8 cent bill credit for those customers.

COMMISSIONER MCALLISTER: Okay. What's this indifference charge? Could you describe that?

MS. SILICANI: Yes. There are a variety of indifference charges that were prescribed as part of our decision. These include (indiscernible) management charges, regis charges, resource adequacy, solar value adjustments, proxy value for PCIA and -- I'm forgetting one -- but it comprises -- marketing and administration are solely supported by these customers as well.

COMMISSIONER MCALLISTER: Okay. Any round number for what those will be for a typical residential customer?

MS. SILICANI: The specific indifference charges?

COMMISSIONER MCALLISTER: Yes.

MS. SILICANI: I think we're around 2 cents for all of those charges, but again one of those charges is a

function of the customer class as well. And we just filed all of the rates by customer classes or the request for that rate approval in our Customer Site Implementation Advice Letter.

COMMISSIONER MCALLISTER: Okay. So there are versions of this going through from all the IOUs; is that correct?

MS. SILICANI: That's correct.

COMMISSIONER MCALLISTER: Okay, great. Now, maybe Manny's going to talk about Edison's? No. Okay. Thanks for that.

MS. SILICANI: Thank you.

MS. RAITT: Okay. Next is Sue Kristjansson, from Sempra Energy.

MS. KRISTJANSSON: Thank you. Sue Kristjansson. I'm the Codes and Standards and ZNE Manager from SoCalGas. And I highly suspect that my deck is going to really kind of tie into the topic of conversation today, considering the mentions of electrification.

But I do thank you for having me here. I appreciate the opportunity to come here and discuss the ways that natural gas will help California meets its ZNE and longer-term GHG goals going forward. Next slide please. Thank you.

Ultimately, we want the same thing. We have some

pretty aggressive goals. We want to reduce the carbon emissions in the state. We want to double the efficiencies, based on the Governor's State of the State.

And I was quite pleased today with some of the things I heard. It seems like there's a little more acceptance of natural gas and awareness of the need for natural gas on a go forward from -- between Martha's comments about the cost implications of the new and exciting grid, over the 30-year period, and the calculation of TDV and recognizing that nature gas is the more cost effective. To the gentlemen, Dave from CARB, being so accepting of what we're working on with biogas and biomethane. And different opportunities that we have to clean the natural gas for pipeline injection and really contribute in some significant ways. So I was very heartened by those comments. Next slide please.

So natural gas is absolutely part of the solution. And we've talked today about some of the challenges that we face in getting to Zero Net Energy. We have the intermittency of the Grid, balancing the Grid components. We have the driving the efficiency to the levels of generation that we are replacing in the first place.

And then of course the economics, which is a pretty significant element in the state. A quarter of

California's residents, as per the U.S. Census Bureau estimation, is that a quarter of California residents live in poverty. And so when we look at cost implications of some of the things that we're going to adopt or move toward who ultimately is going to pay the price for it in the long run. But we're here because we believe that natural gas can help that.

And some of the examples -- and I don't have that in my Power Point -- it didn't even occur to me until I saw Kathy's presentation, but SoCalGas is actually operating in a world of ZNE right now as well. We're actively participating in the Prop 39 Combined Project. We are a partner in the big two, which is the High-Performance Attics and High-Performance Walls Training of the Builders. We have a sponsorship for a KB Zero 2.0 in Lancaster, as a matter of fact.

We have the Commercial Playa Vista property, the resort, which is a commercial multi-use property for an entire community in Playa Vista. And we have the ABC 2.0 and 3.0 homes that we're the title sponsors for right now, which have full complements of natural gas technologies and equipment in them and meet Zero Net Energy. So we're very proud of those projects. Next slide please, thank you.

And to that end, we recently commissioned a study. Navigant did a vision study in 2014 and as you can

see, natural gas is absolutely the preferred choice of the consumer.

And I think a lot of times when we're moving down the road toward Zero Net Energy and energy efficiency -- which we 100 percent are in line with that -- we tend to stray away from or maybe forget for a moment that the consumer is out there and they have very specific wants and needs. And we have to factor that in and balance what we're trying to achieve here.

These are just a snapshot of just six of -- well, there's the four main end-uses in any residential new construction now, but they even from open-ended questions added fireplaces and outdoor living as major elements that they prefer natural gas.

And ironically I was at a conference in D.C. with Ralph DiNola. He had hosted it, NBI had hosted it. And one of the questions in the final day -- they were doing a survey and it was to the audience who, if I might add based on kind of my acceptance in the room, was very electrification-focused. "How many of you believe that on-site combustion should be allowed?" And the result was 67 percent, so this is pretty widely accepted. Next slide please.

Not only is it preferred, but it's affordable, which is one of the main reasons that it is preferred.

These might look like small numbers to some of us, but over a year between $200 and $750 is a pretty substantial number to the quarter of the California population that lives in poverty right now. Next slide, please.

And then from an efficiency standpoint -- Martha touched on this a little bit -- because TDV really is factored around the source or the primary energy elements, when you factor that in natural gas is far more efficient than electricity -- not renewable of course. So this is a snapshot of the two current states, right? It's pipeline gas and it's transmission electricity, but there is a huge difference in the efficiencies of the two commodities. Next slide, please.

So "Zero Net Energy, How are We Going to Get There?" This is consulting study that we just commissioned with Navigant.

And this is kind of along the same theme that we've been talked about. I think Kathy mentioned it a little bit, so it's integrated design looking at how you're doing the building shell and daylighting. It's looking at the highly efficient technologies, both natural gas and electric. Optimizing -- getting some automation in there with some smart technologies. And then, of course, your renewable generation on top of that. So it's not a one or the other, it's both. It's "and" and "both."

So this Navigant study -- if you'd go to the next slide, please.

The other element is that it indicated that a mixed-fuel home achieved Zero Net Energy just as well if not better than an electric home, because at this point in time, as we talked about with the source energy calculation and TDV, natural gas is in many cases more efficient than its electric counterpart. So here it is in the numbers.

We had an opportunity to present this to some of the CEC staff a little over a week ago. We're going to go more in-depth into the study, discuss it a little further and really look at the results as they come out, which should be sometime this week. Next slide, please.

And the cost savings as well, so here's an opportunity. We talked about -- who was it who talked about -- Farakh, you talked about reducing the size of the PV systems and that was a goal. A mixed-fuel home actually achieves that, because when you have that have the efficiencies of the -- I'm sorry?

MR. RAYMER: No, that's okay. I'm saying wow.

MS. KRISTJANSSON: Oh, okay. I thought you said "What?" So --

MR. RAYMER: Well, we can say that too.

MS. KRISTJANSSON: Yeah, I was pretty pleased.

As you gain your efficiencies in the natural gas appliances and using highly-efficient technologies in both, in the baseline both the electric and the natural gas, you can reduce the size of your PV to accommodate the rest of the load. Next slide, please?

Oh, I'm sorry, back one. I did miss the differences in the utility costs and the TRC values are both positive in the mixed-fuel home as opposed to the electric-only ZNE home. Next slide?

And then I'll just touch on this very briefly. Between now and 2020 we've got whatever we're working on in the state to get moving toward the ZNE mantra and goal.

And then from 2020 to 2030 we're going to have to look at some things that are currently not cost-effective in any way. You know, fuel cells are not cost-effective, but we're trying to drive that. We're trying to move the needle on that kind of thing.

And that feeds into the discussion today about community generation. Does it have to be electric only? Does it have to be solar PV only or are there opportunities for natural gas community generation? I personally think there are. My company thinks that there are. And there are a lot of people -- based on the response I got from my presentation being posted on your site and the support that I got via email -- I think there are a lot of people that

are moving in this direction and recognizing the value that natural gas brings to the discussion. Next slide, please.

But this is just a right-now what we just talked about in the prior slides. SoCalGas is doing a lot of things moving toward an energy system that is clean, both air quality, efficient, and really serves the entire discussion of energy and the environment. Next slide.

We touched on biogas a little bit. Commissioner McAllister, you asked really how much could we achieve through renewable natural gas? And the answer is up to 40 percent of natural gas pipeline. So I think that's pretty substantive, so we have some projects already that we've been doing for years. And they're wildly successful. We've got Gill's Onions, (phonetic) we have a couple of different plants. And we keep moving the needle on these technologies and advancing them to get to that point, because ultimately that's our goal as well. Next slide, please. I'm trying to hurry, because I know we're behind schedule.

Power-to-gas --I don't know who here has heard to power-to-gas. This is the process of taking -- let me back up. In the EU -- I'm sure you've all heard in Germany they had a little issue with overproducing and having nowhere for it to go. So this is an opportunity to take that excess renewable energy, put it through a very scientific

system that you can all see on the board there -- I'm not a scientist, I can walk through it, I can read the slides -- but basically its capturing and separating out the molecules, so that you use some for one element and some for another and then re-injecting those or storing them. So it's a really good opportunity.

We've got some work going on in this area right now. And I don't think it's too far in the future, considering that Europe kind of paved the way a little bit for this. And the next slide.

So ultimately, we're marching to the same 2050 goal as everyone else here. We are absolutely confident that we play a significant role in this. We're going to continue to do the work that we're doing, knowing the value that we bring to the future environmental impacts and goals of California.

And overall, quite honestly, I think that the gas industry is probably thinking in the same way that SoCalGas is. I think that maybe this is not information we've gotten out in the past as aggressively as we're trying to now let you know what we've been doing for a long time. And what we continue to do, because we are ultimately in the same state with our families and kids and we want the same things as everyone else. So thank you.

COMMISSIONER MCALLISTER: Thanks very much for

being here, I guess two quick questions.

So I mean I've talked with Dennis Ariela (phonetic) quite a bit about these issues. And I certainly appreciate all the creativity Sempra and the Gas Company are bringing to this topic. So you answered my question about biogas. Thanks very much.

And I wanted to know what SoCalGas's participation in the Carbon Study Work that the Investor Owned Utilities are doing as we transition.

So there's a ZNE discussion that really is sort based on our current thinking about ZNE, but if and when we transition over to a more carbon metric, as the gentleman from ARB was talking about earlier -- and that I think that all of us believe we need to do at some point, because the bottom line metric is carbon. You start counting those molecules and it's sort of difficult to know. You know, the scenarios are widely varying in terms of what the impact or what the relative participation of gas combustion at the local level can be.

So I guess I'm wonder what's your participation in that discussion, the modeling of the carbon scenarios and figuring out what metrics the utilities are going to bring to the table?

MS. KRISTJANSSON: So I know that we have an Air Quality Department that handles that, but I do know -- and

it's not specific to carbon, but we've done methane leak studies. We're in the middle of an indoor air quality study with LVNL and GTI check-in, (phonetic) because now that we've increased the efficiency of the building shell what are we trapping inside that can't get out.

So we're proactively trying to move forward and find out the answers to these things, so that we can look at what we can do early on to combat them. And make sure that we're cleaning the air and we're doing what we have to do as we rapidly advance building and those elements. So I know that they are, and I can definitely get some specific information for you, but I'm not within that world.

COMMISSIONER MCALLISTER: Okay. That's great. I guess it seems important, certainly for Sempra and for PG&E's gas side to understand what the electricity modelers are doing in the investor and utility world, really across just the electric sector. And what their assumptions are about end uses and the electrification of those end uses for purposes of carbon accounting, because I think that's going to affect gas end use. And the gas company and the gas folk suppliers ought to really know about that and align with that in some way.

MS. KRISTJANSSON: I agree to an extent, but I do think that there's a shift in the mindset a little bit about natural gas a lot more information comes out and

people start to see the work that the gas industry is doing overall. So I'm confident that we're --

COMMISSIONER MCALLISTER: I'm not disagreeing with your presentation. I just think that, you know, there may be a little bit of left hand-right hand going on within the industries.

MS. KRISTJANSSON: Yes, I would agree with that.

COMMISSIONER MCALLISTER: So I would advise sort of to triangulate a little bit there.

MS. KRISTJANSSON: Yes, thank you.

COMMISSIONER MCALLISTER: Thanks a lot.

MS. RAITT: Okay. Next is Manuel Alvarez from Southern California Edison

MR. ALVAREZ: It's still good morning, I guess. I'm trying to keep you on track here for this day.

I guess I just wanted to kind of remind the Commission -- I think you're well aware of it -- that the utilities in general and the (indiscernible) specifically, who have been supportive of your Title 24 and your Title 20 as well as any federal efforts that go on building standards, so we appreciate it.

But I guess I was taken this morning to your opening comments about, I guess from conception to compliance, is a long and winding road. And this, today's meeting as well as our meetings we had in 2011 and 2012

when we drafted the 2013 IEPR to set those things, actually raised a number of issues at least from my perspective on the regulatory front we've seen a lot of progress and we've seen a lot of activity.

So if you can just change the slide if somebody is there. Actually, I think you're well aware -- I didn't see you, Heather, behind that screen.

MS. RAITT: I know, I'm hiding.

MR. ALVAREZ: I think you're well aware that Edison has always emphasized that energy efficiency comes first. That's definitely what the state's loading order is all about. And as you're aware -- you brought it up earlier in your comments, Commissioner -- there's definitely some challenges with the renewables. And that's something that we're going to have to face on a policy as well as the programmatic activities that are going to have to be addressed.

We're confronting that now on some of the projects that we're involved with. And I'll talk about that a little bit later. But then after we do our deep energy efficiency we definitely want to get into the renewable as the final step to get to Zero Net Energy Home.

Edison has a number of projects going on with the Net Zero, so I just wanted to list them out for you there. During our written comments I'll work with your staff if

they want to know more specific or more detailed information on where we are with these particular activities. I'll bring that to you in our written comments.

We have three active projects that are currently undertaken and I think in those projects you're going to find that we're dealing with gathering information that'll be useful to you in drafting this particular IEPR dealing with some of the Grid impacts, some of the activities that we're doing on the commercial buildings, nonresidential buildings, some educations with our builders and our building community. A lot of work on retrofits in terms of construction that we're doing in existing homes. And finally looking at the community area and how we deal with both the onsite, offsite questions that go along with this activity.

But one of the most important things that I think in the list of these projects is that there's a number of people and a number of activities that actually go behind any individual project. And so there's a whole infrastructure of resources and talent and education that is being undertaken today, at least in the projects that we're involved. And hopefully we're preparing for that future that you're envisioning in the 2020 and 2030 timeframe.

So with that I guess I'll just close and answer any questions you may have. And perhaps illustrate to you the kinds of projects we have there. And then our final slide, just that it takes a large number of people to get involved. So even though you see one or two of us here before you talking about these activities there's a whole group of people behind each and every project and each and every activity. So with that, I'll finish off.

COMMISSIONER MCALLISTER: Thanks, Manny. So you have a lot of photos about the Solar Decathlon, so I mean that's down in Irvine and I imagine that's a big deal for you guys. Maybe you want to elaborate a little bit on that?

MR. ALVAREZ: Actually, I'm not involved in that program personally, so I'm not sure I can do. But I'll actually have it highlighted for you in our comments.

COMMISSIONER MCALLISTER: Oh, great. Okay. Yeah, that Solar Decathlon has come to California now, I think it's a great opportunity in Southern California after a number of years where they had gray weather and rain on the mall in D.C. And they just couldn't kind of make the buildings work properly as designed. They opted for a sunnier spot and I think that was a good move and it's great for California to have I think what'll end up being a long-term site where they can really put these buildings

through their paces. And Edison's been a good partner in that, so thanks for being here.

MS. RAITT: Okay. Next is Obadiah Bartholomy from SMUD. I'll get your slides here.

MR. BARTHOLOMY: Hello. And thanks for the opportunity to present here today. Thanks to Farakh for the invitation.

I'm going to be presenting some thoughts that SMUD has relative to some of the discussion we've been having today on the pathways to Zero Net Energy. And speak as well to our current program structure and where we see that going in light of how we're thinking about Zero Net Energy. As well as speak to some of the great impacts we're thinking about and measuring and doing research projects around and some of the shared solar activities that we have for our customers.

So before I launch into this I would just like to say SMUD has been a strong supporter of Zero Net Energy Policy and demonstration projects. And some of what I say may be a little controversial, but our intent is not to move away from ZNE. But try and refine it to something that really delivers the maximum value for its output.

COMMISSIONER MCALLISTER: It's disappointing. You know, Mike Kesey (phonetic) was never controversial.

MR. BARTHOLOMY: In the spirit of Mike then. So

we're wrestling with a lot of questions that are out beyond 2020 in terms of how we're going to get to the state's long-term carbon goals. And not just for electricity, but how can the electric sector help the transportation sector and natural gas sector get to the 2030 and 2050 Carbon Reduction Goals. And really see new buildings as a key opportunity there.

We're also interested in trying to, as rapidly as possible de-carbonize the state's electricity generation mix, understanding how we can drive down the energy intensity of new buildings. Asking the question of how we can ensure that occupants of these buildings will have the lowest possible utility bills. And how we can minimize the Grid impacts to significant new additions to load. So those are the questions. Next slide.

When we look at it, our current definition of ZNE buildings may not be the best answer. And I'll explain why in the next couple of slides. So requiring onsite generation that's equivalent to the TDV annual consumption, of both electricity and natural gas, may result in overinvestment in supply and underinvestment in energy efficiency and increased electrification. And that really depends in large part on how we look at the loading order and the cost tradeoffs and the kinds of forecasts that re driving those out into the future.

Utility investment in the required back-up infrastructure and generation capacity could not be recovered by those that are moving into these new homes depending the rate policies that the utilities put in place now and going into the future to help pay for that infrastructure.

And really the question of whether we zero out at the building level versus at the network level, and leverage the infrastructure that's been put in place, is one that we're wrestling with very heavily in terms of how do we maximize the amount of carbon that gets reduced for each dollar invested? So next slide.

So one of the things that we're looking at, and are going to be providing comments on, are really the appropriateness. And we talked a bit about the definition of ZNE, which I agree is a nice, neat, clean definition for something that's fairly complex. But when we look at it, it's really can we think about trying to redefine it from Zero Energy on an annual basis with TDV, to focusing on some of the outcomes that we really want from a policy perspective from new construction buildings.

So focusing on zero peak demand, so that we don't have to add Grid side infrastructure to support these homes; focusing on Zero Carbon, so that we don't have to make major investments down the road to retrofit these

homes to meet the long-term carbon objectives of the state.

Making sure that these homes are as demand responsive as possible, so that we're able to use them as resources to integrate new renewables. And that means including more controllable loads in homes than we're currently contemplating.

And supporting the transportation sector initiatives, making sure that these homes are ZEV ready and include the infrastructure to support -- an easy decision to choose zero emissions vehicles in the future for customers that are moving into them.

Some of the things that we also think are worth part of the -- worth being part of the discussion -- are the use of shared rather than onsite solar PV. And when we think about that, think about structures where builders may pay for the net costs of serving these new construction loads from zero carbon resources that may be beyond solar resources. But that's something that we think may make sense to think about as an upfront investment like the solar PV is an upfront investment in these homes. Next slide.

So in thinking about those elements we've been designing our new construction program to try and take all of those into account. To look at an integrated demand side management approach that's focused around peak

reduction, trying to make what sounds really complicated to be really easy actually for builders to participate in. And move us towards ZNE readiness, but really with an eye towards ultimately moving towards zero carbon. Next slide.

So the structure that we have for our SMUD Smart Home program 2015, we've gotten six or seven builders signed up for this program right now. It requires a program entry of a HERS score a 84 and then provides performance points for additional HERS scores for each point that you get lower than that. As well as bonuses for peak reduction if homes can be under 1 kW average peak demand from 4 to 7, not counting solar PV as well as for facing your solar PV in a west-southwest orientation and including 100 percent LEDs.

Looking forward -- next slide. I'm sorry, I forgot to mention we require that the homes be zero emission vehicle ready, so the conduit is installed and there's a sticker in place saying, "Install your EVSC (phonetic) here. And as well, include a smart thermostat for demand responsive control." Next slide.

Looking out into the future we have an evolution on the efficiency towards more behavioral programs that interface with our time-of-use rates that will be rolling out in the future, growing our demand response component and trying to really promote the use of that smart

thermostat and enrollment in our demand response programs with it.

On the PV and storage side we're exploring incentives for distributed storage within these homes. We think that will be a nice opportunity for that, cost-effectively in the future. On the PEV side I mentioned that these are EVSC-ready. We're going to be offering an installed EVSC bonus in 2016. And then expect to require for participation, EVSC be installed post-2018.

I mentioned our RTOU rate, so I'll skip that one. But on the electrification piece we're looking pretty heavy at electrification and its cost-effectiveness for customers. And expect that when we think our RTOU rate in particular, that's going to be an opportunity for use of electric technologies. Especially some of the more efficient heat pumps that are coming on to the market now with COPs above 3 and reaching towards 4 and 5 in technologies that we're seeing out of Japan. We think there is tremendous opportunity for carbon reduction today and for cost-effective water and space heating in these applications. So we're expecting to be moving towards an all electric home bonus and this is really focused around cost-effectiveness from a long-term carbon reduction perspective. Next slide.

In thinking about how ZNE might impact the grid

I'm going to speak to two ways that we're looking at this issue from a research perspective right now.

The first is on voltage impact where we see if we have significant geographic concentrations of solar -- we can see voltage fluctuations faster than the current system regulates it, which could result in short-term excursions outside of voltage standards. It may result in increased losses of the distribution system if we have to keep the average voltage level higher to deal with passing clouds, increased wear on our substation voltage regulators and increased investment in distribution voltage controls out on our feeders -- are all things that we're exploring and trying to understand the costs of right now. Next slide.

There's also the overgeneration issue that we're examining. And, for example, we're looking at system sizes for ZNE that are likely going to be at least 3 to 4 kW or as much as 6 kW if we're going to include EVs in these homes. Daytime loads that are typical for a springtime day are on the order of maybe 300 watts, so we're looking at exporting probably at least 90 percent of the output from these systems during these spring days. Which we see a high likelihood that that's going to conflict with high-hydro and high-wind conditions resulting in a curtailment of zero carbon generation.

Thinking about curtailment, when we look at

curtailing all of these distributed systems we expect that's going to present challenges not just with reliable communication to these systems, but also with coming up with ways to structure tariffs and compensate customers for any curtailment that might occur.

COMMISSIONER MCALLISTER: Obadiah, could you -- does SMUD have contractual vehicles to sell excess elsewhere? Like could you export it in Devato, (phonetic) could you do that?

MR. BARTHOLOMY: We can export --

COMMISSIONER MCALLISTER: You're your own balancing, right --

MR. BARTHOLOMY: Yeah, so we could sell energy in to CalISO or into the Northwest if we have excess and its forecast on an hourly basis in a way that we can actually schedule it.

COMMISSIONER MCALLISTER: Yeah, but you wouldn't -- not being a member of the ISO you wouldn't be participating formally in the EIM or those sorts of vehicles, right?

MR. BARTHOLOMY: We're examining EIM, but at this point we've not made a decision about whether or not that's something that's going to provide more benefit than cost to us at this point.

COMMISSIONER MCALLISTER: Okay. Thanks.

MR. BARTHOLOMY: And the last item there is that looking forward into the future, especially as we reach towards 50 percent or higher levels of renewables on the Grid, we expect that the value of solar PV is going to drop in the future. And that the cost to nonparticipants may offset the value of ZNE to participants, if we're really focused around solar PV as the sole resource for meeting that ZNE goal. Next slide.

Just briefly in thinking about a shared approach. We think there is likely a lower cost per kilowatt hour of solar energy produced. There would be more control over siting for where on our distribution system those solar assets could provide the most value. We think it's likely easier for us to deal with pricing changes going into the future as we look at kind of decoupling our fixed infrastructure costs from our volumetric costs in moving towards time-of-use rates.

We see some increasing system benefits if we can couple those demand-side measures with centrally located, more predictable solar profiles than we might see from distributed solar profiles.

COMMISSIONER MCALLISTER: Let me jump in one more time, so just a quick question as we go along here. Have you been able to quantify the benefits? You know, Martha before talked about how well the finding cost-effectiveness

of different approaches can be challenging in carbon -- and the pocketbook don't always match. And demand response seems like a place where that's particularly difficult given the flux in rates and the changing needs of the Grid etcetera.

So I guess I'm wondering do you have a methodology or had you been able to assign some numbers to the benefits for DR that could actually be relevant for code development?

MR. BARTHOLOMY: We're working through those issues with our Integrated Resource Plan and our energy traders in trying to really figure out what the right balance is between customer convenience and flexibility. And how they participate and value to the Grid in terms of planning for that resource over a long term. So I would say we're working on it. I don't think we have a great answer for you today as to what we've got.

COMMISSIONER MCALLISTER: Yeah, I wasn't necessarily expecting one. I think we're sort of maybe starting to think about similar issues in the TDV context, just directly. But how to value DR is a difficult one as well.

MR. BARTHOLOMY: Yeah, but important. To speak to some of the things Bob brought up, this would provide an increased latitude for a building design and orientation in

not dealing with some of the roof constraints that he mentioned. As well, there's no competition with trees and that's something that's really important from an aesthetic and an energy savings standpoint.

And then increased assurance that the monetary value of the generation is going to equal the value of the energy consumed. Especially as we look over the long-term, kind of that question of whether we're overbuilding solar as a result of code and finding out that the value is not there in terms of the overall Grid benefit. Next slide.

So I'll close with this. This is a project that we're working on with DOE funds to move toward a high-value integrated community solar project. We'd be demonstrating the customer and system value of shared distributed PV when combining that with distributed demand side measures that improved the match between customer load shape and generation curve. So it'll be a combination of distributed storage, EVSE control and demand response-type programs combined with that community solar approach.

So that's, I think, my last slide. Thank you.

COMMISSIONER MCALLISTER: Thank you.

MS. RAITT: That's our last speaker for this panel.

COMMISSIONER MCALLISTER: Okay, great.

MS. RAITT: So if you'd like we could move on to

public comments or --

COMMISSIONER MCALLISTER: Yeah, I guess let's do that. I think I've kind of gotten my questions answered as we've gone along, so I'm good. Thanks.

MS. RAITT: So if there are those --

MR. RAYMER: We had a few comments. I cut mine short, so --

COMMISSIONER MCALLISTER: Okay, sure. So let's see, where are we with respect to the schedule, Heather?

MS. RAITT: We're about on schedule now.

COMMISSIONER MCALLISTER: Okay, great. Thanks panel, for being effective and efficient with your comments.

So anybody who wants -- do we have any blue cards at all? It doesn't look like we do, if anybody wants to speak maybe you can cue up in the back there. And we'll start with Bob.

MR. RAYMER: Yeah, thank you, Commissioner. Bob Raymer with California Building Industry Association. I'd like to make a couple of additional comments on transition and sort of a HERS anomaly that we've come across.

Regarding the transition to the 2016 Standards, and also looking at the ZNE component, Cathy early this morning spoke of the program that the PUC has put together to find a handful of builders who are going to be doing

production projects. And to effectively assist with the design and implementation, not just passing money from Point A to Point B, but actually trying to get over this hurdle.

The high-performance attics and the advanced wall systems are two deep energy efficiency, very highly productive items that are going to create sort of a dynamic change in common design practice. And that type of assistance is key to start the snowball effect where they learn how to do it over there, others see it, and it gets implemented.

Along the same lines the solar sort of option with the 2016 Regs is going to be equally as important. The New Solar Home Program is going to be phased out in the end of 2016. It has the potential of running out of money prior to that. We're going to do what we can to make sure that doesn't happen, but it may. So consequently there needs to be other ways to get those builders who have yet to sort of stick their toe into the solar arena to do it. And obviously the solar option with the 2016 Regs does that.

And lastly, we've run into sort of a HERS anomaly regarding solar that I didn't expect to see happen. And that is once you build a home to 2016 Regs, that you've done everything -- advanced walls, high-performance attics,

tankless water heaters, etcetera -- we've had a number of builders, one that I place a great deal of confidence in, who you've already mentioned today, who went ahead and just started playing around with the system. And found that getting that last 40 to 45 points off the HERS score was half as costly by doing solar as it was efficiency.

And this -- I figured there was going to be sort of another potential round of efficiency upgrades. But right now, you know, depending on what system you're using out there -- and I have to assume that he was using the two systems available to us in California: the California HERS and then the National. That in both cases getting that last 40 points off your HERS score was easier to do cost-wise. I'm not saying it was cost-effective, but I'm saying that was an interesting finding.

And I suspect that as we move towards the ZNE package in Part 11 you're going to see a lot of solar and perhaps not a lot of additional efficiency going in here. That's assuming, of course, that we're not talking about plug load strategies. There's a lot to be done on plug load, so if we just look at traditional energy efficiency measures solar may become the option of the future. So that was my two points.

COMMISSIONER MCALLISTER: Thanks, a lot. I wonder if that's surprising to staff on the 2016 front?

MR. ALVAREZ: You know, Commissioner, it's not surprising to me. It's starting to materialize in some of the projects that we're involved with where when you get down to this last bit of energy savings, that some of the renewable projects are in fact more cost-effective than the energy efficiency projects.

So it calls into question from a development perspective, I guess, where the loading are and what conflicts it may present there. And as we stated earlier we definitely have a high penetration of energy efficiency as our first priority.

COMMISSIONER MCALLISTER: Yeah, I mean I guess we're at the margins in a lot of ways. We're also subject to historical kind of approaches for cost-effectiveness, etcetera that may or may not be perfect for today or going forward. So I think those are exactly the conversations that we need to have. And obviously the landscape has changed on solar and it's gotten a lot cheaper. And I mean, we're there, we're where we are, so let's talk about it.

MR. SHIRAKH: Mazi Shirakh, it's not surprising. You know, you look at the measures that we've incorporated: the high-performance attics and the walls, the lighting and the tankless water heater. There are few other measures we can consider for 2019 like QII and so forth, but other than

that when we're talking about displacing the plug loads and unregulated loads solar is definitely in the play, you know, with the measures. So it's not surprising what he's saying.

COMMISSIONER MCALLISTER: Okay. Thanks.

Yeah, Bill wants to talk too. Here you go.

MR. PENNINGTON: Taking the opposite view, I think the presentation that Farakh did this morning shows that for a lot of climate zones we're not down to the 40 or 45 points here. We're more like 60 or more in some climate zones. So I think we need to look hard for some additional measures here, so we're getting close. I appreciate that we're getting close and maybe in the coastal climates we're there, but not so much in the hotter climates.

COMMISSIONER MCALLISTER: Also I'd just say like comparing energy efficiency with solar isn't an apples to apples. There are other effects that -- you know, the indoor environment is affected in myriad ways by efficiency and it may not be by PV. But our tools don't necessarily let us elaborate on that, right? So I think it's good to work through these issues and how locally specific, how climate zone specific, we really need to go and how granulated and disaggregated. That's always attention that we have and so I think approaches to that -- maybe we have two or three bins of climate zones that we break out going

forward or something.

MR. PENNINGTON: Great, thanks.

COMMISSIONER MCALLISTER: I don't know, but creative ideas are very welcome there. Thanks, Bill.

MR. MCHUGH: So again to be along here with Bill Pennington, this is Jon McHugh.

When we look at options with energy efficiency one of the huge barriers to any state Energy Code is federal preemption. And the opportunity in 2019 to actually look at a duel-path standard where you're meeting all of the -- or potentially a large fraction of the remaining loads with solar -- you can have an alternate path, which has been done in other states such as Washington and Oregon. Where you have one path, which has the minimum federal efficiency requirements and then you have a dual-path or a second path that has substantially higher levels of efficiency than the minimums.

So right now the Federal Standards require that the minimum efficiency is both the floor and the ceiling for state energy codes. And that is something that is a huge opportunity for the state. As I remember it's something on the order of 10 to 15 percent of regulated loads. So that's a very first step.

So to some extent looking at a ZNE Standard frees up the state's options to look at those sorts of things.

Thank you.

COMMISSIONER MCALLISTER: Don't we have that though? Don't we kick it over to the performance pathway and we can do things that vary from preemptive?

MR. MCHUGH: So I'm shaking my head no for the court reporter. And the reason is that we have the performance approach, performance approach though, the baseline and standard is set on the prescriptive requirements. So no, the performance approach allows us to minimize our cost in meeting the Standards, but it doesn't allow us to minimize the cost of the prescriptive standards.

COMMISSIONER MCALLISTER: It doesn't allow you to go beyond the minimum energy budget, say.

MR. MCHUGH: That's right, thank you.

COMMISSIONER MCALLISTER: Okay. Thanks, Jon.

All right, next.

MR. SUYEYASU: Good afternoon. I'm Dan Suyeyasu. And I'm actually here wearing a slightly different hat than I've usually engaged with Commissioner McAllister, so you will be pleased to know that.

COMMISSIONER MCALLISTER: Thanks for being here.

MR. SUYEYASU: We actually recently have developed a policy proposal, Kim Goodrich is distributing our paper, in collaboration with the engineering firm,

ARUP. This actually started when we worked on the Technical Feasibility Report at ARUP for the IOUs for the state a few years ago.

And what we saw that ZNE was developing was a ton of opportunity and a lot of promise, but also this potential that ZNE policies might create greater burdens on high-density development than what was being sort of put upon low-density development. And we didn't like where that was going and so started to just brainstorm internally, solutions to this problem that would make offsite compliance much easier for buildings.

We wanted to make offsite compliance basically as easy as onsite compliance. And so this policy proposal is basically just a pro bono effort of our respective firms. So just walking through it, at the core of our proposal is something a little bit akin to what I've heard out of SMUD today and also the green option from the IOUs, is really favoring an aggregate supplier of offsite Zero Net Energy. We are essentially calling this Zero Carbon Power.

We think that there are institutions that are well suited to try and get as much efficiency and renewable on to a building onsite. That is the developers. That is the building officials. But really once you take that step beyond the building site you really need to expand your solution set. What we see right now is a lot of just sort

of the default ZNE solution, sort of the first step offsite matches as close as possible, the last step onsite. And we don't think that's helpful. Once you get offsite you really need to bring a fresh perspective on how this is going to happen.

In particular, community solar options that tie very tightly one solar installation back to a particular house, and actually to the property itself as would be needed under the code, creates all sorts of problems long-term for everyone.

So how would this work? A building official would work the developer. They would come to some conclusion that there's just not enough roof space to be ZNE onsite. And then the building official, when they hand off permission to the utility to hook up this new building to the Grid as already happens, they would simply check a box saying, "This building is offsite authorized."

From that point forward the utility, which just sort of plays the role of what we're calling a ZNE aggregator would supply the Zero Carbon Power to the building sort of extensively for the end of time or however long this policy needs to stay in effect. It's like the green option, it's just mandated by the ZNE Policy.

COMMISSIONER MCALLISTER: So this would get built into the entitlements process or what?

MR. SUYEYASU: It would just hand off, essentially, responsibility to the utility long-term to supply the Zero Carbon Power. And perhaps one of the more useful thoughts here is once you have an aggregator buying this offsite power in aggregate you can actually bring efficiency into that portfolio as well as renewables. So we would actually amend Cathy Fogel's sort of ZNE Loading Order to have a step 3 that you actually bring in some efficiency offsite once you sort of expand the solution set there.

COMMISSIONER MCALLISTER: So offsite efficiency, okay.

MR. SUYEYASU: Yeah, offsite efficiency. You've got a supply 100 gigawatt hours per year or whatever it might, it would be a blend of distributed renewables and efficiency. Basically whatever the utility working with its regulatory agencies thinks is most sustainable and has the least grid impact.

COMMISSIONER MCALLISTER: So what's the business model there? I mean, you've got some kind of commitment that the developer and the City say -- or the County or whoever are agreeing to that applies to the life cycle of that building. But yet you've got a customer who then is going to be saddled with -- if it's more expensive, which we heard from PG&E it is by 4 cents or something, then what

does that mean for the customer going in to buy that building and then having to pay that bill?

MR. SUYEYASU: We think this is much easier to implement for everybody. And what it does is it creates an on-demand ZNE solution such that they need as much Zero Net Energy Power or Zero Carbon Power as they are using. So this policy is shifting the burden to the building occupant. But that is actually a much more sensible to do this, we think, than trying to get some sort of offsite commitment upfront by entities that aren't really qualified do that.

COMMISSIONER MCALLISTER: Right.

MR. SUYEYASU: This is sort of the expand the solution set here once you get offsite. So it would create a 3 center per kilowatt hour premium for the occupant, but they're either going to see that in their mortgage with an upfront solution or they're going to see it long-term either way I think.

COMMISSIONER MCALLISTER: Interesting, okay. Thanks a lot.

MR. SUYEYASU: Any other questions?

COMMISSIONER MCALLISTER: No, I think for now that's it. Thanks.

MR. NARAYANAN: Good afternoon and thank you for the time. I'm Ram Narayanan and I'm with the Electric

Power Research Institute.

And I just wanted to make a few comments regarding some learnings with a ZNE community pilot that we are doing with the SE (phonetic) support and also support from the CPUC.

And so just some learnings. We are at the point where we are working with the builder, the builder is about to start building 20 homes, concentrate on the distribution transformers. But there's been a lot of learning with regards to the metrics and the measures that go in.

One of the key things that we found about TDV is that TDV really helps us do the tradeoff on gas and electric. And we ended up with gas usage for all the lifestyle loads, the fireplaces etcetera, but the builder preferred heat pumps for comfort. So we ended up with a mix of gas and electric.

We also found that when you apply high-performance attics and high-performance walls that the actual -- the PV sizing is only about 4 kW. That's in line with what Obadiah was suggesting too. And it's for Climate Zone 10, so it's a pretty hot climate.

And when you're able to get it down to that size what it does is this community has 90-degree bends and all the different orientations. And you can actually fit the solar much more easily, because the efficiency measures

really enable the PV deployment to get to zero. And this is zero by TDV too.

The other thing that we found is that for the builder the cost of solar is the only cost differential to get to ZNE. So at that sizing when you start getting the size of the solar down it's actually quite cost-effective. Or the cost differential is quite small to get there.

The other thing we found is that by ultra-switching to the electric appliances we actually had a side benefit, which is we got rid of a lot of venting, which cleaned up a lot of roof space for the solar to go in. That was a key benefit that we saw too.

And I also agree with Obadiah on the controllable load. So part of this is looking at Grid integration on the distribution circuits. So we are looking at the role of body controllable loads and customer site storage (indiscernible) storage's transformer to see what makes sense from Grid integration. So essentially it's looking at what happens in California in 2020 when every home is ZNE and what do we do to the distribution grid?

And the final point I wanted to make was the cost of operation, is that when you get the energy use so far down then the major cost of operation is almost just the monthly charge for the landed (phonetic) utilities. So in a sense it doesn't matter whether you're doing gas or

electric, but your main costs for operation comes down to the monthly landed charge.

So just a few learnings, we are still kind of working on it. There's a lot of work to go and we'll try to keep everyone abreast on the efforts as they go along.

COMMISSIONER MCALLISTER: Great, thanks for the update. I really appreciate all your work on that and looking forward to hearing periodically how it's going.

MR. SUYEYASU: Okay.

COMMISSIONER MCALLISTER: Great, thanks.

MR. SUYEYASU: Thank you.

MS. BROOK: Hi, Martha Brook with CEC staff. I just had a question for Obadiah. Have you looked at what the cost of carbon needs to be before that electrification option is cost-effective?

MR. BARTHOLOMY: Yeah, I think it's heavily depending on the cost of natural gas and where that goes. And one of the things I'm curious about when you guys are looking at the future price of natural gas is whether we're looking at a de-carbonized natural gas pipeline for that cost of natural gas, which I would expect would add substantially to the cost of natural gas that we'd be working against.

When we've looked kind of in the near-term though, we see a tradeoff for a heat pump water heating to

be cost effective at about a 10 center per kilowatt hour electric rate versus about $1.25 per therm type of gas rate. So depending on if you are looking at a TOU rate or if you've decoupled and pulled some of your fixed infrastructure costs, those electric rates are not that unreasonable. That gas price is a little bit higher than the current bundled gas price, which includes both the volumetric and the fixed infrastructure costs.

COMMISSIONER MCALLISTER: But that's nowhere near the 4X you were mentioning or the difference between gas and electricity, right?

MS. BROOK: Right, so one thing that's interesting in terms of the de-carbonized gas, current practice is when we do that long-term view of costs we need to have a policy that we say we're going to meet. So we would have to have a de-carbonized gas policy that we could say, "Okay, we're going to get there in the future. And therefore we'll count those costs in our TDV."

So that's I think, important for when we have these discussions in terms of what we can do now in the code. We could do that if we had a policy that would affect -- because we put renewable policies on the electricity side, but we're pretty flat on the gas side. We don't have a lot of policies there that we're really asserting we're going to meet.

COMMISSIONER MCALLISTER: So Martha and others, you should come to the Thursday afternoon IEPR Commissioner Workshop on Preliminary Natural Gas Outlook. So that was a great little segue to it.

MR. BARTHOLOMY: Can I make one last comment on the question of the 3X or 4X? I think it's really heavily dependent on whether we're assuming a time-of-use rate for the natural gas -- or for the electricity consumption and whether we assume that this is a controllable load that can be kept off-peak. I think that's really critical for looking at cost-effectiveness of electrification. And given where the state's rate policies for electricity seem to be going, I think it's very relevant for the Commission to be assuming that as a future scenario.

MS. BROOK: Yeah, I'm a numbers person, so I'm not quite sure I agree with you yet. I like when you said it, it sounded practically like correct, but the minimal amount -- in terms of the electricity to gas, the minimum is like 3.1 and the mean is 3.8. So those high electricity costs aren't changing the average cost very much in the TDV metric. So maybe that's something we need to talk more about.

COMMISSIONER MCALLISTER: Okay.

MR. ALVAREZ: Commissioner, I have a question since Martha is up here, maybe? If we're going to have a

further discussion on the TDV are we going to have that here in the IEPR process or are we going to have that in the Building Standards Formulation?

COMMISSIONER MCALLISTER: So the TDV Update typically happens in the prep period for the following Building Standards Update. So it typically does not happen in the IEPR although we can have any discussion we feel is policy-relevant in the IEPR. So it's not -- you know, that particular discussion is not scoped into this IEPR, but -- and I'm not going to make a pronouncement that it should be, because I don't want to make Heather too nervous here.

But I think we're hearing today that the TDV -- that the metrics by which we compare all of the different fruits that we have, and try to get them all to be apples, is a really important discussion. Because I mean, we know that TDV -- I mean, it's been incredibly useful. It's very helpful to have that long-term view with assumptions that are vetted and agreed upon.

But as we move towards thinking about low-carbon I think we're seeing that none of the metrics that are in use in the state really -- I mean, they're all kind of kludged together to have layers of carbon on them. But they're not really looking at carbon as the fundamental metric, so I think that's really a discussion that's becoming very timely.

MR. ALVAREZ: Commissioner, I guess I would agree with you, because even though we all kind of look at the impacts on the Grid in terms of the development here, what we're really talking about is kind of the impacts on the state's energy economy overall. So those cross-sector activities are pretty important.

COMMISSIONER MCALLISTER: Yeah, well if that's our unifying metric is carbon long-term -- I mean, all of our policies are aiming towards that -- then the way we value it has to stimulate investments in the right direction. And so I think that's really what we're talking about here. And to the extent that we don't have metrics that do that we need to figure out how to get there.

MS. FOGEL: Hi. Just on that point I'll just make a little announcement. There's a new Integrated Demand Side Management Proceeding at the CPUC and it hasn't really come out publicly yet, but we do expect that cost-effectiveness issues and creating a framework to align approach to cost-effectiveness across our different resource proceedings will be something that that proceeding will take up. And also talking about how to fit in basing it around a carbon metric rather than comparing to combined cycle generation, which is what we currently do.

So I don't know if that will help the TDV work you're talking about, but just something to be aware of

perhaps.

And the other thing, I kind of wanted to thank Obadiah for broaching the topic he did. I think the questions that he broached are some of the ones that we hope our research will get into and to help define some quantitative variables more to the extent we can. And we're trying to get this happening in time to provide any data from those results in time for the 2016 TDV Review. And so distribution upgrade costs might be a consideration. You know, smart inverter costs.

But also the NEM issue and where that rate lands, I think, is pretty important. And you almost have a chicken and the egg consideration, because there are costs to nonparticipant in NEM and the whole NEM Rulemaking is trying to figure what the right NEM Rate is by considering those cost transfers amongst other things.

But, you know, when you come to requiring ZNE in code where that NEM Rate lands and what it assumes about nonparticipant costs is important, I think, for how cost-effective this will be seen as. So we do want to provide some data to that discussion. And, you know, do you think there's a role to look at ZNE Ready as an important goal going forward and to be a little more open-minded about offsite renewables. You know, maybe not thinking of them only as an exception, but do we need to refine our goals

for sort of our upcoming grid expectations.

So this is something we want to make sure we continue to dialogue on between our agencies.

COMMISSIONER MCALLISTER: Yeah, I would love to -- I mean, I'm assuming we're collaborating on some of this already, just at the staff level, but a couple of areas in particular. I mean, what distribution investments get driven by different policy decisions and what that requires across the board, you know? And that's one of those issues about nonparticipants -- just sort of what costs are we actually going to socialize through rates? That's one big question that I think we should definitely collaborate on.

And then the other one is the plug load research that you're doing -- is super relevant for both sides of this, but new and existing. So really looking forward to working with you on that going forward.

Thanks a lot, Cathy.

Does somebody on the Panel what to say something about this or no? Okay, great. It looks like Jon has another comment.

MR. MCHUGH: My last comment was responding to Bob's thoughts, so that was good.

Jon McHugh, McHugh Energy. I guess the main thing I'd like to have folks walk away from here thinking about is how critical the Zero Net Energy Tier in the 2016

CALGreen is for helping guide all the related effort that people have talked about. So the discussions about ZNE programs and to the extent that we actually don't know what ZNE is there's some uncertainty about what it is.

The ZNE Tier is actually something that provides a concrete metric of what the latest thinking on ZNE is in terms of the state's or at least the Energy Commission's policy. And what needs to occur is that the software tool actually calculates how much PV is generating. Right now that's not in the tool. Right now there's been some work done on plug loads, because the plug loads that were in the original HERS Rating are actually too high. And actually in terms of concerns about PV systems being oversized, actually having the correct plug loads in the CBECC Res Tool will allow that to occur.

So I'd just like to encourage that there's a lot of people working together from a bunch of different places: from CBIA to all the utilities to the CPUC. That everyone's really got to be focused on here's something that the state has defined as ZNE, actually making sure it occurs, making sure it actually goes over the finish line. So that, you know, in a year or so there's actually a clear cut definition of what is ZNE.

So the IEPR has had a definition, but it talks about TDV etcetera, but that's not really a clear

definition for people in the market. So that someone can say, "I go to KB Homes and I bought a ZNE House, do I actually know that it is? Someone else says it's ZNE. Both of them have solar panels on the roof. How do I know if they're ZNE or not?" This actually describes, yes this is the state-approved definition. This is how it's calculated.

And right now even though we're pretty close, we're only one code cycle away from this target, we actually don't currently have that state-defined very clear definition. So I'd just like to focus that that's a really important first step. Thank you.

COMMISSIONER MCALLISTER: Thanks, but I thought in the 2013 IEPR that's what we were going to be able to do. But we didn't quite get there, so ongoing. Thanks.

So is there anybody else in the room? Yeah, go ahead.

MR. BRAND: I'm Larry Brand with the Gas Technology Institute. We have a program with Sam Rashkin called Building America that we're working with DOE on various designs for new construction. And he's doing a lot of great work in Zero Energy Ready. So I feel like there's a good pathway to getting our HERS Ratings down into the area where we have a shot at getting to ZNE if we can take advantage of a lot of the work that's been going on.

I guess I would encourage that we separate our ZNE objectives and our Zero Carbon objectives. That you take those one at a time. ZNE, from the work we've seen in Building America, there is a carbon benefit to getting to ZNE. And if we could focus on maybe one thing and get to ZNE in our designs and our approaches, and then maybe beyond that the next make incremental efforts there to get to Zero Carbon -- comment.

COMMISSIONER MCALLISTER: Thanks for the comment. Thanks for being here.

So I think, do we have folks on the Web and on the phone?

MS. RAITT: Yeah, we have a couple of people on the Web who wanted to make comments.

So the first is Marissa Blunschi. Go ahead, Marissa, if you're there.

MS. BLUNSCHI: Oh, hi. This is Marissa Blunschi with Edison. And this is actually a question that I had at the very beginning of the workshop. But I know that Cathy from the CPUC mentioned within the context of ZNE the Net Energy Metering Successor Tariff and the E3 Calculator that was recently released. And I wanted to confirm something that she said. It sounded as though they were planning to release the final version sometime by the end of this month. And that was the first I'd ever heard of anyone

mentioning something like that. And I wanted to confirm whether or not that was true.

And then whether ZNE has come into play more within this proceeding or if there's been any coordination as to how certain ZNE goals or anything like that -- policy implications -- have been incorporated into that tool?

So I don't know if Cathy is still around to speak to that, but that was my question.

MS. FOGEL: Yeah, I am here. So yeah, I spoke with NEM Energy Division staff last week and they did confirm that the plan in that proceeding is to release the final tool by around the end of May.

And as I mentioned pretty briefly Title 24 ZNE requirements have been considered. It's an element that can be included in scenarios to assess the costs of the NEM tariff and cost transfers. The assumption in there is that ZNE code would result in about 400 megawatts of additional onsite solar annually if it were required under Title 24.

Now, that's an old assumption. It's based on a 2012 PG&E TRC or HMG study that had some pretty crude assumptions about uptake levels and so on. But a 400 megawatts annually of new rooftop solar was approximately what they found. So lacking any better data that's what we included in the tool.

And so the next phase of the proceeding as I

understand it is the final tool is released and the participants in the proceeding will comment to indicate what should be the scenarios to assess NEM costs? And those in turn will inform the development of the tariff. And so it'll be up to parties whether the ZNE assumption is included in the scenarios to assess the cost. So yeah, I hope that answers the question.

MS. BLUNSCHI: Thank you.

MS. RAITT: Thank you.

Okay. Next is Michael Nguyen. Michael, go ahead.

MR. NGUYEN: Yes, this Michael from the Energy Coalition. I have a few questions. The first question is to Commissioner McAllister. Will you comment what are the barriers to adopt the Greenhouse Gas Accounting in our policy decision and what would be the critical policy step to move towards accounting the costs of GHG energy programs?

COMMISSIONER MCALLISTER: Well, let's see. I guess that's a more complicated question than probably we're going to be able to -- there are a number of different regulator authorities here. We own code here at the Energy Commission, but the way we do cost-effectiveness and the ways that -- well rather than try to answer that I think I would encourage you to submit comments and present

your observations about those issues.

I mean, I know you're working with stakeholders on the ground in the L.A. area. And I think there's a fairly significant record, both in the 20 -- well, really starting back in 2007 on the issue of ZNE. And many stakeholders have brought up the various issues. I think we've made a lot of progress since then, but even as recently as 2013 when we talked about this there was a significant record on ZNE and the problematic about figuring out, for regulatory purposes, a definition of that that we could all aim for. And we're now picking up on some of those issues today, so I think rather than go over that record I would commend you to have a look at it and incorporate some of your reactions and the Energy Coalition's perspective on solutions to some of the ongoing barriers.

MR. NGUYEN: All right, thank you.

I'd like to ask a follow-up question to Martha. Does CEC's Time Dependent Value methodology include system capacity constraints when you determine the cost of delivered energy? And do you publish the TDV Map for all delivered energy services in California?

COMMISSIONER MCALLISTER: Was that a question for staff, maybe Martha?

MR. NGUYEN: Martha.

COMMISSIONER MCALLISTER: Yeah. Okay, there you go.

MR. NGUYEN: Yes.

MS. RAITT: She may have stepped out, because there's --

COMMISSIONER MCALLISTER: I think Martha stepped out. Is there anybody else that can take a stab at that?

MR. PENNINGTON: So that's a pretty complicated question and I think we'd prefer to have it in writing and try to respond to it that way.

COMMISSIONER MCALLISTER: Yeah, so I think if you can provide the question in writing to staff then they'll be able to respond to it.

MR. NGUYEN: Okay. Thank you.

COMMISSIONER MCALLISTER: Thank you.

MS. RAITT: Okay. Next, George Nesbitt, are you on the line?

MR. NESBITT: Can you hear me?

MS. RAITT: Yes, go ahead.

MR. NESBITT: Yes, George Nesbitt, HERS Rater. Missing from this discussion and pretty much every other one about ZNE homes is reality: state law, state code, state standards.

In the '90s the Energy Commission was directed to create a rating system. In 1999 it adopted the first

phase, which included what I call HERS Verification for Code Compliance, got written into the 2001 Title 24 Building Code for the first time. And it was supposed to be followed up with a rating system, but the electric deregulation crisis -- it got swept under the run during that. So then we had AB 32 calling for ZNE. Then we had the CPUC Strategic Plan in 2007-2008 calling for ZNE.

And in 2008 in the room you were all in, the Energy Commission finally did Phase 2 of the HERS Regulation creating a HERS Rating System where we defined ZNE as "Net Zero time-dependent value based on 2008 code." Amazingly enough it actually includes carbon. You can account for different utility companies, different utility rates to the customer. It includes a tradeoff between gas and electric. It includes a lot of things that either people either say we need or wonder if we can do in all of this. Yet, we have failed to implement it and use it.

We've allowed Build It Green to come up with a GreenPoint Rated Index, which is really a HERS Index. Energy Upgrade California has allowed uncertified contractors to use essentially uncertified software that does the same thing without creating a HERS Index. And now they're going to allow other software packages you can't even use for code compliance.

And then now that we have CBECC we're creating

this new Energy Design Rating, which is really a HERS Rating. And then we have the CAP Score, (phonetic) which is really also a HERS Rating yet it's not a HERS Rating, because it's not using the HERS Rating software or the system we set up.

Sadly if we spent half the effort working on implementing the rating system, working some of the bugs -- I don't have a problem debating whether TDV is right or this is wrong -- but it should be in the context of what is regulation, the system we have, the system we should be using and it should be based on actually implementing it and making it work better.

And I certified the first new single-family home ZNE in 2012. The Energy Commission wrote a nice proclamation and also working on multifamily affordable ZNE. And even though all these projects are in the Utility Rebate Programs, they've been in CAP or Multifamily Home or NSHP they actually have not received any support from the CPUC or the utilities, because they are ZNE.

And all of this actually is being either driven by say me as the rater, or other requirement funding sources. Thank you.

COMMISSIONER MCALLISTER: Thanks, George.

Martha?

MS. BROOK: Hi, George. This is Martha Brook. I

just wanted to mention that we do have on our schedule to revisit the HERS Rulemaking for the Whole House Program. And we're going to be discussing all of these issues then, so thank you for your patience. And hopefully you'll be able to participate in those discussions.

MS. RAITT: Okay.

COMMISSIONER MCALLISTER: Thanks.

MS. RAITT: Excuse me, does Abhijeet Pande -- do you have a question on the line?

MR. PANDE: Yeah, this is Abhijeet Pande with TRC and I just wanted to echo something that Jon McHugh had mentioned about the TDV destination and how to sort of make it into practice.

And I wanted to highlight one particular aspect of that IEPR definition, which I would personally like to see with more clarity, but perhaps others might find useful, which is that the IEPR definition does mention that the building should have a certain level of energy efficiency based on current or high-efficiency building practices. And going back to the discussion around how much solar you need, the more efficient we can make the buildings the easier it is to get towards the ZNE goals.

I was just curious what efforts are there going to be at the Commission to maybe solidify what those EUI targets are for the building or what the energy efficiency

targets would be as part of that? And this applies both to residential and commercial.

COMMISSIONER MCALLISTER: Maybe that's -- Farakh, can you take a stab or Bill?

MR. NASIM: Yeah, so as far the proposed language in Part 11 we do require that a ZNE Code Tier Building meet the Tier 2 efficiency requirements. So there is that component that you can't just use PV to get you all the way there, that you do need to get 30 percent beyond 2016. And as far as commercial we don't have a ZNE proposal yet.

COMMISSIONER MCALLISTER: Thanks.

MS. RAITT: Okay. That's all our comments on the WebEx and the phone lines.

COMMISSIONER MCALLISTER: All right, great. So I think that gets us to the end of our agenda; is that right?

MS. RAITT: Right.

COMMISSIONER MCALLISTER: Okay.

MS. RAITT: So we welcome written comments and they're due on June 1st and --

COMMISSIONER MCALLISTER: Yeah, for the record we were scheduled to end at 1:00, right?

MS. RAITT: Yeah, we were.

COMMISSIONER MCALLISTER: Excellent, oh my gosh. Okay. I'm very proud of us everybody, so keep up the good work.

Thanks everybody for coming. I think discussion has been really good and hoping for even better in your written comments. There are a number of -- you know, there's a half-dozen issues I think of varying magnitudes and timeframes that we really need to think through in a coordinated way. And really we're relying on all of you to help us do that both in this IEPR to the extent we can make progress this year, but also ongoing in both Commissions really. And trying to keep our eye on the long-term ball here and figure out exactly what we need the playing field to look like.

So I really appreciate everybody's participation and attention. And we are adjourned. Thanks.

(Whereupon, at 1:02 p.m., the workshop was adjourned)

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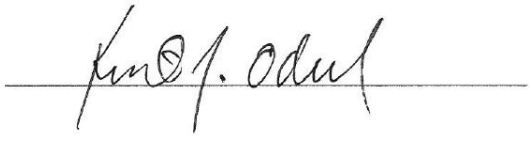

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