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COMMITTEE HEARING

BEFORE THE

ENERGY RESOURCES CONSERVATION AND DEVELOPMENT

COMMISSION OF THE STATE OF CALIFORNIA

In the matter of,	)	
	)	Docket No. 16-TRAN-01
	)	
Incorporating Transportation	)	
Electrification In Publicly	)	
Owned Utility Integrated	)	
Resource Planning	)	

TRANSPORTATION LEAD COMMISSIONER WORKSHOP
INCORPORATING TRANSPORTATION ELECTRIFICATION IN
PUBLICLY OWNED UTILITIES INTEGRATED RESOURCE PLANNING

CALIFORNIA ENERGY COMMISSION

FIRST FLOOR, ART ROSENFELD HEARING ROOM

1516 NINTH STREET

SACRAMENTO, CALIFORNIA

WEDNESDAY, OCTOBER 5, 2016

9:03 A.M.

Reported By:
Peter Petty

APPEARANCES

Commissioners (and their Advisors) Present

Janea Scott, Lead Commissioner, Transportation

Kevin Barker, Advisor to Chair Weisenmiller

CEC Staff Present

Tim Olson

Presenters/Panel Members Present

Amy Mesrobian, California Public Utilities Commission (CPUC)

Marvin Moon, Los Angeles Department of Water and Power (LADWP

Bill Boyce, Sacramento Municipal Utility District (SMUD)

Kapil Kulkarni, Burbank Water and Power (BWP)

Shiva Swaminathan, City of Palo Alto

Jonathan Changus, Northern California Power Agency (NCPA)

Nancy Ryan, Energy + Environmental Economics (E3)

John Tillman, Nissan Corporation

Dan Bowermaster, Electric Power Research Institute (EPRI)

Philip Sheehy, ICF International

Marco Anderson, Southern California Association of Governments

Joel Espino, Greenlining Institute

Jim Hawley, Electric Vehicle Charging Association (EVCA)

APPEARANCES (CONT.)

Also Present

Claire Dooley, NRG EVgo

Lisa McGhee, San Diego Airport Parking Company

Anne Smart, ChargePoint

Colin Santulli, California Center for Sustainable Energy

Tom Ashley, Greenlots

Hannah Goldsmith, California Electric Transportation Coalition

Ryan Schuchard, CALSTART

David Siao, Roseville Electric Utility

Jamie Hall, GM

Sue Hall, Climate Neutral Business Network (Via Telephone)

Mehdi Ganji, Willdan Energy Solutions (Via Telephone)

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P R O C E E D I N G S

OCTOBER 5, 2016 9:03 A.M.

COMMISSIONER SCOTT: We're going to go ahead and get started, and I want to say good morning to everyone. It's my pleasure to chair today's workshop, highlighting the efforts of California's Publicly Owned Electric Utilities to include transportation electrification into the integrated resource planning.

As many of you know, Senate Bill 350, of 2015 statutes, requires Publicly Owned Utilities, with an annual demand that exceeds 700 gigawatt hours, to adopt IRPs, Integrated Resource Plans, no later than January 1st, 2019, and to address electric transportation in IRP procurement planning.

At this workshop, we are seeking initial information about utility planning, capabilities, and challenges, as well as recommendations regarding State Government actions to help implement the SB 350 transportation electrification objectives.

We believe this is an important topic because electric transportation offers significant opportunities, in California, to reduce greenhouse gas emissions, from market growth of electric passenger cars, trucks, and buses, and other transportation modes.

Much of this growth is supported by government

initiatives, such as AB 32, and SB 32, Global Warming Initiatives, Governor Brown's Zero Emission Vehicle Executive Order, and ZEV Mandate, Sustainable Freight Action Plan, and the Energy Commission's financial incentives for electric vehicle charging systems.

Utilities are at the center of the need for electric vehicle charging infrastructure, and we would like to better understand how electric vehicle market growth impacts utility system-wide reliability, and operations, and how utilities will accommodate and facilitate electric transportation growth.

We appreciate, very much, the participation of our four Publicly Owned Electric Utilities, willing to describe their initial efforts, today, and encourage other POUs, and POU's Association to discuss these topics with us.

We also appreciate the participation of seven, independent experts, joining us today, who have insights about factors to consider in transportation electrification integrated resource planning.

I would also like to thank Amy Mesrobian, of the California Public Utilities Commission, for joining us, and making a presentation on the status of a parallel activity, conducted by the California Public Utilities Commission, to address electric transportation

activities taken by Investor Owned Utilities, regarding SB 350.

I would like to encourage the presenters to probe, and ask questions of each other, and of us, during the day, to stimulate a dialogue. And as you see, we put you all around the table.

We've given folks about 15, to 20 minutes, for their presentations, and left time, seven or 10 minutes, after each one, in order to facilitate such a dialogue. So, we hope that you will join us by weighing in.

And I'd like to say thank you to all of us, for joining us.

And we're going to proceed with the first group of presentations. But, let me first, introduce Kevin Barker, who is Chair Weisenmiller's Chief of Staff.

Did you have any remarks this morning?

MR. BARKER: No.

COMMISSIONER SCOTT: Okay. So, welcome. Welcome, Kevin Barker, and glad to have you here, with us, today.

And I look forward to a really fulfilling day. I'm going to turn this over to Tim.

MR. OLSON: Okay, thank you, very much, Commissioner. My name is Tim Olson, the Fuels and Transportation Division, and I will act as a co-

moderator for the day.

Let's see, overall, we're starting here, at this point, lunch hour around noon. And this should go until about four o'clock, or so.

I'd like to give you some, just, background. Feel free to use the restrooms, located on the first floor, right outside the hearing room, and a snack bar on the second floor.

I would be remiss if I didn't tell you that, in the case of emergency, leave the hearing room. Two doors, one at the back, over my left, the one at the right is the main door coming in. And, go out the doors to the Roosevelt Park, if there's a fire alarm or emergency. That's on the corner of 9th and P Streets.

Let's see, I'd also like to remind you that a verbatim transcript of the workshop discussion will be made available on our -- in our public docket, and audit and PowerPoint presentations are broadcast and shown on WebEx.

We're trying to upload all of the presentation on our website, too. That may take another day. Some of them are on there, now, but we had some modifications of some of the presentations, and they'll be up there within a day.

And, also, for those speaking here, please speak

clearly in the microphones, so everyone can hear you. Our transcriber, here, may ask you for a business card, just to get your name correct on the transcript.

And we have this set up to -- where, after each presentation, there will be a Q&A. And we're inviting the speakers, all of the speakers, to comment or ask questions of other speakers.

At the end of the day, we'll have a public comment period, for everybody else.

And as the Commissioner mentioned, there's a blue card that you can fill out, if you want to do that, make a comment.

We, also, urge you to put comments in writing. You can do that e-filing process that's described in the notice, the public notice for the workshop. And that's it, kind of for background.

And I would like to kind of -- and, by the way, the agenda -- we didn't have agendas on the table. We'll have those out there, if you didn't have one.

And, so, I guess we'll start with the first speaker, at this point. And we're asking, to start off, Amy Mesrobian, of the California Public Utilities Commission, to provide some overview comments of the parallel process that's occurring at the California Public Utilities Commission, related to Investor Owned

Utilities. And this is in regard to electric transportation, incorporated into integrated resource planning.

So, let's start with -- Amy, if you want to come up here, you're welcome to.

COMMISSIONER SCOTT: And let me just double check, did you want to do your presentation, first, and then Amy's, or Amy's and then yours?

MR. OLSON: Yeah, I'm sorry. Yeah, I guess maybe I should go through mine, first.

Sorry, Amy.

Yeah, since it's on here, already. This workshop, as I mentioned, is related to electric transportation elements of Publicly Owned Utility integrated resource planning.

And just to refresh your memory, if those who are familiar with SB 350, many of you are, I'm just going to kind of highlight. A general overview, this bill really amends some existing laws that require integrated resources plans, and it focuses on achieving greater greenhouse gas emission reductions, with a specific goal in mind; 40 percent reduction from 1990 levels, by 2030. And it addresses the reductions in electricity sector.

This bill focuses, primarily, on a number of

areas. As many of you know, Renewable Portfolio Standard. But, also, doubling of additional available energy efficiency, gas use efficiency, and electric transportation.

And electric transportation does not have a specific target in the bill. And that's one of the questions we are asking you, today, is, are you planning any targets or any goals in that area?

As many of you know, the bill says that those Publicly Owned Utilities that are required to report, in the IRP process, have to be -- are those that exceed 700 gigawatt hours per year, a 3-year average. And that means, today, 14 POUs are required to do this.

In our interviews, with several other utilities, we found just as much interest in smaller utilities, that do not have to report, in the electric transportation. So, I think there's going to be an interest in learning from this workshop, today. And, also, trying to set up some plans for electric transportation.

And a question, you know, what do we mean by "electric transportation"? Well, I think we're open to that definition. But, for the most part, it's related to what generates plug load. And we know that there are several categories; passenger vehicles, battery

electric, and plug-in electric passenger vehicles, all-electric plug, and plug-in hybrid electric, Classes 3 through 8 buses. There are several off-road categories in the Sustainable Freight Initiative, including warehouse, forklifts, TRUs, ground source equipment at airports. Electric rail could be in that definition, and there might be others that we're just not aware of.

It's pretty, pretty open, but we're looking for your input into that.

We also, as you noticed in your invitation letters, those speakers that received invitation letters, we posed eight groups of topics to the representatives of the Publicly Owned Utilities.

And then, the independent experts we have here, we showed them those questions and asked them to be able to provide comments on those.

And I can just kind of generally go through them, but for the most part we're asking -- asking you, either here today, or over time, to characterize your efforts in this area. And, again, whether you're setting any targets or goals in the future.

We also want to know what your capabilities are to implement, and what challenges you're facing in this process.

We also are interested in knowing where you are,

now, in terms of electric transportation, what the baseline is, how you're projecting growth. And, we also want to know what's the greenhouse gas emission reduction impact of that total effort.

We also want to know what methods you use to make those calculations and, including data that you might have, and your willingness to share that.

Our sense is, the more we get into this, the more data's required to help manage this, and we're looking at that data exchange.

We also asked a question around kind of what you have achieved in electric transportation. Now, these are the areas that we highlighted, as hoping you might have some insights. Your own utility fleet, employee workplace. How you're going to go about the procurement funding. And funding mechanisms, we like some of the mechanisms we've seen with utilities, to date.

We would like you to make some comments about how you use credits and, even challenges with the credits. That would include Low Carbon Fuel Standard, and maybe even the Cap and Trade allowances, how that works for you.

The more detail you can provide on these electric vehicle infrastructure sub-sectors, and I've listed here residence, multi-unit developments,

workplace, public destinations, corridor fast charging. We're interested in knowing what's being accomplished there, whether you see any growth rates, challenges.

We're interested in knowing whether you have any insights about charger reliability. And, we want to know what kind of upgrades are needed on the utility side of the meter, and the extent you want to go into the customer side, in terms of the EVSE activity.

And, of course, tariffs are an important part of this. Any description of that would be helpful.

And, of course, many of your programs include outreach, education, we'd like to hear more about that, and any other activities we don't have listed here.

Other questions are, we're finding that there's a pretty complementary relationship between the utilities and the private firms that provide the equipment or, maybe even significant, more significant roles.

We want to -- we're interested in how those business models evolve, and as it's related to the next topic, which is incentives.

The Energy Commission deploys anywhere from $12 to $20 million a year in electric vehicle infrastructure. Our sense is that the ARB may be doing some of this in the future, with the VW settlement.

And we're constantly looking at this from the stand point of how do we deploy our money in the context of where utilities are deploying money, for similar projects. And in our interviews, we explicitly asked you, should we stay completely away from where you're investing, placing, deploying your money? Or, are there instances where there could be some joint interaction?

And then, we've asked this -- and we're interested, overall, if you have any recommendations on the kind of incentive programs we have set up today.

And then, there's a couple of other questions. One, this intersection of electric transportation, Renewable Portfolio Standard, and any of the efficiency target requirements in SB 350, and we know that there are some issues.

Our interest is to get your comments on the record. That's a way to get that addressed.

And then, of course, we're also looking at this from a very user-friendly stand point. Where do you need assistance in any of this process? And we think that would be helpful to raise that.

So, again, here's some information on how to make public comments. Today, we're open to comments. And then, this e-filing, written comments. The Docket is 16-TRAN-01. And we have set a date of November 1st,

for comments due back to us.

So, that's where we are on this kind of landscape setting for this topic. And we'd like to go into the next speaker, here, as soon as I can set this up.

COMMISSIONER SCOTT: Great. Thank you very much, Tim.

I will just do a reminder, for the public comment, I didn't actually mention the blue cards. There should be blue cards out front, on the table. And if you'd like to make a comment, please be sure to fill one of those out, and you can hand it to Tim. And he'll make sure that Kevin and I get them, and that's how we'll know that you would like to make a public comment.

MR. OLSON: So, now, I'd like to introduce Amy Mesrobian, of the California Public Utilities Commission, to talk about a similar, parallel activity at the California Public Utilities Commission, related to Investor Owned Utilities.

MS. MESROBIAN: Great. Thank you, so much, Tim, and Commissioner Scott.

My name is Amy Mesrobian. I'm an Analyst, in the Energy Division, at the CPUC.

And for my presentation, today, I'd really like to -- you know, we've been doing a lot of interagency

coordination with the Energy Commission, and the Air Resources Board, the Governor's Office, and others, and we want to build upon that collaboration, and try to see if we can facilitate some information sharing across the work that the CPUC does with the IOUs, and with the POUs, as well.

So, for my presentation, today, I'll first talk about what the CPUC and the IOUs, under our jurisdiction, have done in regards to supporting electric vehicles and transportation electrification.

And then, I'll talk about some of the new work that we're doing, related to SB 350, and some guidance that the CPUC has recently given to our Investor Owned Utilities, to give you a sense of where we're going forward in our transportation electrification planning.

So, the CPUC, among other things, regulates the electric Investor Owned Utilities, and there are six of them that we oversee. So, there are three large ones, Pacific Gas & Electric, Southern California Edison, and San Diego Gas & Electric. And then, three smaller, electric utilities, Bear Valley, Liberty, and PacifiCorp. So, I'll be talking about what we're working on with those six utilities.

So, historically, you know, the CPUC is sort of the utility rate regulator. So, when it comes to

transportation electrification work, we've approved the IOUs' electricity rates, that are used for electric vehicle drivers. We oversee deployment of infrastructure. We're doing a lot of work on that, right now, and I'll go into more detail on the next slide.

We look at how the IOUs can provide customer incentives for vehicles, or charging. We look at vehicle grid integration, or how to use vehicles as a resource that can provide grid services, and manage charging to be a grid asset.

We provide customer outreach and education to the IOU customers.

As I mentioned, we collaborate a lot with State agencies, to make sure that all of our policies and programs are aligning towards our bigger State objectives.

and one thing I wanted to mention, in the interest of information sharing, is we had an intern over the past year, at the CPUC, and he helped develop a database of various electric vehicle pilots, and the results of the pilots from across the country, and they're organized by different topic areas.

So, we wanted to, you know, share this information with as many people, as possible, so that

everyone can build upon lessons learned from these pilots, and not have to duplicate efforts. So, I wanted to, you know, make sure that you're all aware of that. And the link is in my presentation, that's online, as well.

So, just to give you a little bit more detail about some of the work that we're really getting into, now, the CPUC recently approved Southern California Edison and San Diego Gas & Electric to start pilot programs to install EV infrastructure.

And there's also a proposal from PG&E, that's pending our review, and a decision should be issued shortly on that, as well.

So, as you see, you know, the different utilities are taking slightly different approaches to the programs. This is our initial -- our initial work, here. So, we're trying things, we're trying pilots to see what works, and if there's a really good model for the Investor Owned Utilities to follow.

So, right now, you know, they're planning to install several thousand charging ports, and mostly focusing on the multi-unit dwelling, or multi-family sector, workplaces, and some public charging, as well.

And I'm happy to provide more information about any of these programs, if you guys want to catch me over

lunch, or something like that.

And so, I think one of the takeaways here is that the large Investor Owned Utilities are really starting to make some significant investments in infrastructure, for the light-duty vehicle segment.

And so, these are program, these are pilot programs, and they can be scaled up, if they're successful, and we can figure out what the best parts of each program are to enhance, in future programs.

And so, we're expecting to generate a lot of lessons learned from these pilots. And this is something that, you know, the POUs that are interested can, hopefully, provide feedback into, and learn from these pilots, as well.

So, now, I'll turn my focus to our upcoming transportation electrification planning. So, with the passage of Senate Bill 350, the CPUC started regulatory work to focus on a number of different issues that were in SB 350, including transportation, and the IRP, or integrated resource planning process.

And so, we actually have two different procedural mechanisms for each of those. So, we have one for transportation electrification and one for integrated resource planning. So, I just wanted to make that distinction, in the CPUC and IOU process, in

comparison to what we're talking about here.

Okay. So, in SB 350, there were specific transportation electrification requirements of the CPUC, and the electric IOUs that we regulate. So, first of all, SB 350 found that transportation electrification was one of the principal goals of the utilities' investments. So, it really elevated transportation electrification to be a primary focus of the investments that the utilities would make.

Additionally, SB 350 directed the CPUC, in consultation with the Air Resources Board and Energy Commission, to direct the IOUs, under our jurisdiction, to file applications with programs, and investments that would accelerate widespread transportation electrification.

And the objectives of the applications are to reduce petroleum usage, and the Air Quality Standards, improve public health, and reduce greenhouse gas emissions.

So, with that requirement in statute, about what we would ask the utilities, we then, you know, consulted with our fellow agencies, and came up with some guidance to the utilities.

So, just a few weeks ago, Commissioner Peterman, the assigned Commissioner for transportation

electrification at the CPUC, issued a ruling to the six electric Investor Owned Utilities, to direct them to file applications pursuant to SB 350.

So, in addition to just telling them to file the applications, we gave them some guidance about when they should file, what their application should contain, and what we wanted them to think about in crafting these proposed programs that would -- we would be considering.

So, just some of the basic requirements. So, the large, three utilities will file their applications, with their proposed portfolio of proposed programs and investments, by January of 2017. And, then, the three smaller utilities will file by June of 2017.

And we're allowing the adjacent, large and small utilities, to propose joint programs. You know, one, because the larger IOUs have more experience to date, and we think that the smaller IOUs can benefit from that experience. And, two, we recognize that transportation corridors, or air basins, don't necessarily align with utility territories. So, there might be interest in, you know, thinking about things from a customer perspective and better aligning utility efforts towards that.

So, in that same line, there also might be opportunities for the POUS and the IOUs to work jointly

on transportation electrification programs, as well.

So, each IOU will submit an application to the CPUC. It will detail their sort of portfolio-wide approach, and then list individual programs and investments that they're proposing to make over the course of several years.

And so, the second point, regulatory review, we've come up with a process that we're hoping can help speed up our review and approval of these programs. Because we know, you know, we're going to get a lot of really good ideas, and applications, and the scale of our greenhouse gas and air quality goals is really -- it's huge, and we want to make sure that we're making good progress towards all of those goals.

So, we asked the utilities to try to identify some of their proposed programs, which would be eligible for more of a priority review. So, these are the kind of noncontroversial programs that have already gotten a lot of buy in from other stakeholders, short term, and lower cost investments, that we would hope to be able to review and approve more quickly.

And then, the remainder of the proposed programs would go through our standard review process, which would take no more than 18 months to review.

Okay. The next, more substantive area that we

gave the IOUs guidance on, is the scale and the scope of their proposals. And so, we suggested to the utilities that the portfolios that they propose with us, that, you know, summarize all of their different programs, should achieve their proportional share of the State's vehicle and emissions reduction goals.

So, we know that the IOUs are not responsible for all of the transportation sector emission reductions in their territories. There are other State, and private, and individual actions that will contribute to those goals, as well. But the utilities should try to figure out, you know, what's reasonable in their service territories, and then, what their proportional share is of that.

And then, in addition, as we've been aligning more with State agencies, we also wanted to make sure that, in their portfolio planning, the utilities were thinking about, and aware of, all of the other related processes that are going on.

So, the utilities will have -- the IOUs have a separate proceeding for their Integrated Resources Plan, but we want to make sure that when they're developing their transportation electrification proposal, they're thinking about how those can align.

And, similarly, you know, we know that the

forthcoming Scoping Plan will have emissions reductions numbers in there, and we want to make sure that the utilities are targeting those emissions reduction goals. And, that the programs can be flexible enough, so that if we get numbers this spring, from the Scoping Plan, we can kind of increase, or decrease, some of the utility programs to make sure that they're meeting whatever those greenhouse emissions reduction goals are.

And so, the final thing is, you know, we wanted the utilities to get experience in multiple sectors. So, for the large IOUs, to date, a lot of their experience has been with the sort of residential market, and light-duty vehicles. But we think it's important for them to try out new things, in other sectors, as well.

And so, the final part of our guidance ruling looked at the portfolio design. And so, again, we wanted to provide the IOUs enough flexibility to allow them to be creative, come up with proposals that could be specific to their utility territory, and meet their customer needs.

But throughout our public process, we heard from stakeholders, and our sister agencies, that there were a few areas that were really barriers, or sticking points. And so, things like rate design, and things to address

the cost of using electricity as a fuel. Demand charges has been a pretty common thing that we've heard about in our procedural work.

Again, expanding the focus from light-duty vehicles to other sectors, because we know that to meet air quality goals, vehicle -- targeting vehicles in other sectors will be really important to meeting those criteria pollutant reductions.

And then, again, we want to emphasize this alignment with other State policy planning initiatives. And so, the Zero Emission Vehicle Action Plan, that the Governor's Office Leads, is sort of the overarching document that talks about how different State agencies will contribute to transportation electrification. And we want to make sure that all of the IOU programs align with those State goals, as well.

And then, finally, we want to make sure that all of the programs have an eye towards safety, they're considering the safe operation, installation, and maintenance of all infrastructure. And, make sure there's an emphasis on safety for the utility workers, general customers, and the EV drivers, themselves.

So, now, this slide just talks about kind of our implementation and timeline. So, in 2016, we've mostly been in the kind of planning and guidance phase.

One thing I do want to highlight, for everyone, is in November, the CPUC will be hosting a workshop. And the goal of the workshop is to inform the IOU applications.

But I think it could also be really helpful for any of you, in the room, or for the Publicly Owned Utilities, because the two things we'll be talking about at the workshop are, one, the results of previous utility, and other State pilots in the transportation electrification space. So, the goal of this is just to, you know, inform everyone that we've done certain pilots, we have some lessons learned. And, rather than duplicating efforts, we should all try to build on what one another has done.

And then, the second part of the workshop will look at vehicle grid integration, communication standards, and try to figure out if there's a certain standard that the CPUC should adopt for the utility proposals.

So, that's the main thing to keep an eye out for in 2016. In 2017, we'll be, actually, receiving the utility proposals, and evaluating them. And then, after that, the utilities will start implementing.

So, one other thing I wanted to just mention, from a process stand point, I mentioned that our IRP is

a separate proceeding. And so, to date in that processing, the staff have issued a concept paper to propose some ideas about what an Integrated Resource Plan might look like. They're currently in the process of getting stakeholder input on that.

And then, internally, at the CPUC, they're getting feedback from, you know, us, in the transportation area, and other areas that will feed into IRP, to figure out how this is all going to work, and interact.

So, their next steps are to issue a staff proposal, at the end of the year. And then, the load-serving entities, under CPUC's jurisdiction, will file their IRPs in late 2017.

And so, that's the end of my presentation. And, if we have time, I'm happy to take questions.

COMMISSIONER SCOTT: Great. Thank you, very much, Amy, for your terrific presentation.

I had just a couple clarifying questions for you, and I'll ask our other speakers, and panelists, to think about if they have any clarifying questions for you, as well.

You mentioned the November workshop.

MS. MESROBIAN: Uh-hum.

COMMISSIONER SCOTT: Do you have a date for

that, yet, or not quite, yet?

MS. MESROBIAN: I think it's going to be November 9th. We haven't announced anything officially, yet.

COMMISSIONER SCOTT: Okay.

MS. MESROBIAN: But something will come through on our service list, and we can -- I can make sure that Tim is aware of that.

COMMISSIONER SCOTT: That would be terrific. No worries. I just wondered if that was out there.

And then, I think for folks around the room, or on the WebEx, if they are interested in looking at the white paper that you mentioned, on the IRP process, do you have a link to that, where people would be able to find it?

MS. MESROBIAN: Yeah, absolutely. It's on the website and I can follow up with the link to that.

COMMISSIONER SCOTT: That would be great.

MS. MESROBIAN: Or, maybe, just add it into my presentation.

COMMISSIONER SCOTT: Sure, sure. That would be great. That way, folks will be able to find it.

MS. MESROBIAN: Great.

COMMISSIONER SCOTT: Thanks. Do we have any clarifying questions from Tim, or Kevin, or folks around

the table here?

I think your mic went off.

MR. MOON: I'm trying, yeah.

COMMISSIONER SCOTT: There you go.

MR. MOON: Marvin Moon, L.A. Water and Power. Just a quick question. Do you have any feel for what kind of programs they'll be proposing?

MS. MESROBIAN: So, we're actually meeting with the utilities, next week, to get their initial reaction to the ruling, and start talking with them about their proposals.

So, one thing we did say, in the ruling, is that for those initial pilots that they're doing on the EV infrastructure, we want that to kind of be a separate process. We'll see how those pilots go. And then, they can, if they're successful, they can scale those up in a kind of separate proceeding.

So, in the SB 350 applications, they, perhaps, would look at, maybe, the multi -- or, sorry, the single-family residential sector. If they're interested in light duty.

And then, we're, I think, at least for the large utilities, we are expecting them to look at the other segments a lot more closely, as well. But, yeah, no more detail, yet.

COMMISSIONER SCOTT: Any others from around the table? Oh, we're just going to take them from the Panel members, for now.

Okay, great. Well, thank you, so very much, Amy.

But, please, be sure to write it down on a blue card, and get it to us, so that we can read it into the record.

And I will turn it back to Tim, for our next presentation.

MR. OLSON: Okay, our next presenter is Marvin Moon, who is the Director of Power Engineering for Los Angeles Water and Power.

And, you're welcome to do that presentation over here. Let me see if I can bring up your --

COMMISSIONER SCOTT: While Tim's bringing it up, I'll mention, we do have kind of an ambitious schedule, with lots of presentations. So, Marvin, we gave you about 20, 25 minutes, so that would be 10:00, 10:05, and then a little bit of discussion amongst our Panel folks, which would go until about 10:10, or so, and then we'll move on to our next presenter.

MR. MOON: Thank you. I'll make it on time. And thank you, so much, Commissioner Scott, and to Tim, and Lesley, and others that put this together. It's

such an exciting thing to talk about. One of my favorite topics, transportation electrification.

I'm going to be talking about three things, real quickly. One is the role of transportation, and how it relates to our Integrated Resource Plan, what the plan is, and what we've done, and what we're planning to do, and what's needed moving forward.

So, with that, of course, fortunately, we have a very robust Integrated Resource Plan, that does include a very big section on electric transportation. And it talks about, you know, obviously, the benefits to our customer, due to the extent of 75 percent less greenhouse gas emissions, the efficiency aspect of the cheap transportation, integrating renewable sources. And, also, of course, every electric vehicle is equal to about half-a-house of load.

In addition, it talks about the new industries in a green economy, and better utility assets utilization.

We have a goal, from AB 32, for 80 percent reduction in greenhouse gas emissions, below 1990 levels, by 2050. And CARB reported, in 2012, that 30 percent of the GHG is from transportation, where the electric generation is 11 percent.

So, we looked at all sorts of scenarios, and

evaluated which way to go, between renewables, and transportation, and the likes of that. And we have -- the recommended case, moving forward in our plan, is 50 percent renewables which, of course, is now a State law. No coal. We had three coal plants. We just sold the second one last year, and now we're down to one. And high energy efficiency effects go over the top.

We can't use ocean cooling, anymore, on three of our power plants, so that's a big effort. And, of course, high electric transportation is one of our goals, as well. And it's all specified in this Integrated Resource Plan.

So, here's a graph. This shows, with that recommended case, that high electrification, the 50 percent renewables. If you look at the solid lines, that dashed line, at the bottom, that's the 80 percent mark that we're trying to reach, below 1990 levels.

But the solid lines don't reach it. The only way that we're going to reach it is through electric transportation. And those are the little dashed lines that get real close to it. So, that's based on our modeling, from where we are today, even with those very aggressive goals that we have.

So, then, how aggressive do we have to be? So, if you look at this blue line at the bottom, that's the

forecast from the California Energy Commission, on where they think the electric vehicles are going to be, over the next couple decades.

But to reach the goals that we're targeting, it's the green line on top. And, which means that we need to hit about 145,000 electric vehicles in L.A., over the next five years, or up to 580,000 by about 2030. Now, that's huge.

Right now, in L.A., we have about 23,000 electric vehicles. So, how do you get from 23,000 to 145,000? That's the question.

Here's, also, energy intensity. If you look at, on the left here, here's a graph of how much CO2, per megawatt hour, we have, currently, in our mix, at least from last year, before we sold our coal plant.

In 2026, the little blue one, that's going to be our energy CO2 per megawatt hour.

The bar on the right, that's electric transportation. That's how much CO2 equivalent, for electric transportation, you can reduce by going to electric.

So, there's a four-to-one ratio of switching from gasoline to electric.

And, if you look at our Integrated Resource Plan, there's eight, big programs they talk about. They

talk about ocean cooling, getting off that, power reliability, coal replacements, energy efficiency, local solar. And electric transportation, according to our IRP, is the only program we have that actually reduces the cost of electricity for everyone. Not just those that are driving cars, but all people.

And the reason is, because, if you have cents-per-kilowatt hour, if you can sell a lot of kilowatt hours, without a lot of investment, then the cost goes down. So, that lower, right corner shows the line going below the horizontal access, because that saves money for everybody. That's huge.

Okay. So, it also talks about -- our plan also talks about some big problems that we have. One of them is the intermittency of renewables, obviously. Over-generation from solar.

In fact, we modeling that by -- when we get to 50 percent renewable, we're going to have about 2,000 hours of over-generation that we're going to have to deal with. You can't turn it off, because you don't get the credit, you've got to sell it. And so, what can you do? Well, EV's maybe a solution to that.

We also have that huge ramp rate. You know, right on that little, blue line, on the right side. We're going to have to come up with 3,000 megawatts in

about an hour and a half.

Very often, you know, when the sun goes down and the solar goes out, we have to kick in our generators, and a lot of generation isn't really designed to do that. So, how do you deal with that?

And, of court, EV is a solution. We feel that we can do a lot of mitigation on this with new rate structures, letting people -- the trick to this whole program is getting a lot of cars, and having them charge at the right time.

We also see a future, down the road, not today, but down the road for dynamic price signals. For people saying, now's the time to plug in your car, you've got a fire sale on power, let's do it.

And also, the EV infrastructure support. In L.A., we have a ratio of 20 electric vehicles for every public charger. Well, that's terrible.

In fact, according to ChargePoint, they say it should be about, roughly, four or five cars per charger. So, if people aren't going to see the chargers out there, how can they get enthused about getting these cars? And that's something we need to take care of, as well.

And, of course, the load factor. That's how smooth our load is. If you have real spiky load

factors, for a utility, that means you have a lot of generation sitting around, that's not being used most of the year. It's just for those 100 or 200 hours per year to hit those peaks. And it's getting worse.

With energy efficiency, and the solar, and our sales are practically flat for the next five years. But our demand is going up .9 percent, per year. Which means that I have to make investments to cover that, and that's expensive.

So, how can I mitigate it? Well, this may be a partial solution to that, as well.

Okay, so here's our plan, here's our five-year plan. And we make some big assumptions. I told you, we want 145,000 cars, or the equivalent of that in five years. I can't get there with just car sales.

In fact, if the sales of cars were to go up, up to 15 percent of all new cars, were plug-in cars, I would only get halfway to that goal in five years. I'd get to about 70,000, 75,000.

So, how do you make up the rest? Well, we're going to do it by -- we're going to count the cars. We're also going to count public and workplace chargers as car equivalents. In L.A., we have about 400,000 cars that come in to work, every day. Those are cars that are coming in, they need charging, the same thing as if

they were in L.A., permanently.

Also, we have a lot of cars, that they come, in plug-in hybrids, perhaps, and they get to work, but they can't get home electric, so they're using gasoline to get home. So, workplace charging has a role, and that counts, as well. So, that will get us partway there, as well.

And we also want to consider other sources of electric transportation, such as heavy-duty. MTA just bought six buses. LADOT just bought four buses. Every bus, on our calculation, is about 20 electric vehicles. We're going to count that. We plug in electric ships, we're going to count that. That's equal to about 70 to 100 cars. So, we're going to count everything, heavy-duty and whatever it is. If it moves, and plugs in, we'll count it as part of our plan.

Okay. This is probably one of the most important slides in my whole presentation. This is our whole EV plan on one page. And, it's got six parts to it.

In the upper left is education and outreach. Everybody talks about this, but you don't see it happening. And I really have to applaud the Plug-In Electric Vehicle Collaborative, for their efforts to really pull it all together. Pull the utilities

together, and the OEMs, and the NGOs, and everybody else to get that -- get people trying the cars and getting them to buy the cars.

And that's to get to our goal of 15 percent of adoption, of new car purchases, in L.A.

Again, there's so many angles on this thing, with homeowner's associations, and apartment owners, the whole nine yards. So, that's an area we need to do a lot of work.

On the upper right is L.A. Fleet. We have a Sustainability Plan that says that 50 percent of all new cars that are purchased by the City have to be electric vehicles. For L.A. Water and Power, all new, light-duty will have a plug on it.

In fact, LAPD just bought 100 vehicles. We just bought another -- we have, about, another 44 LEAFS. At the end of five years, we'll have about 1,600 vehicles. And that's not going to cost me anything, because that's paid for by the respective departments.

Residential charging is huge, on the right. In L.A., 89 percent of the charging is done in the home, and 80 percent of that is off peak. That's perfect. And so, we've had rebates, since May of 2011, to basically, to pay for chargers. So, we currently have rebates for that.

And, very soon, we'll be doing a Smart Charger rebate, a rate demo, and I'll talk about that in a minute.

On the lower right, City vehicle infrastructure. We have a goal of 1,000 public or curbside chargers, over the next five years. And 1,600 City fleet chargers, of course, every car that the City buys needs a charger. And, 25 DC fast chargers. Currently, we've installed 16. And, 500 workplace chargers, which will equal 3,100 chargers on City property.

And over in the lower left, this is where all the money is, commercial charging. Water and Power currently has a $21 and a half million rebate program for commercial charging. That supports public charging, workplace charging, and commercial, multi-family. That's what's on the commercial meter.

We're paying $4,000 per charger, up to 20 chargers per site, so it's $80,000 rebates per site.

And the medium and heavy-duty fleet, that's the toughest nut to crack. And it's lagging behind light-duty, and everything's kind of a one-off on that, but we're doing some work in that area, as well.

Okay. So, like I said, the City infrastructure is huge. We've installed over 300 chargers on City property, including LAX, in the parking structures.

We have, currently, in the next year and a half, we'll have another 400 more. And part of that's part of our Low-Income Cost Sharing Program.

We've installed 16 DC faster chargers around L.A., that was part of a grant we did with the Department of Energy. It was kind of a Smart grid demo.

And Plug Share says that some of those chargers are the most popular in the State. In fact, we've installed one at the zoo, and I heard that it had 1,800 sessions in the last four months. So, it's just over the top.

In fact, the biggest user for that is Uber and Lyft drivers. So, without even knowing it, we enabled an electric taxi fleet.

On the customer side, again, we've had rebates for the last five and a half years. We're giving $500 per charging. The commercial's $4,000 per charger, 20 per site. And, of course, grants for heavy duty.

The Department, currently, we have 111 electric vehicles, and we'll be up to about 240 by the end of the year. We are supporting other city departments, as well, and, of course their infrastructure required for that.

Here's a couple pictures of our chargers, our fleet, and one of our DC fast chargers.

We're trying new things. Here's a picture, on the left, of a streetlight with a charger on it. Real Street Lighting's installed 32 of these, to date. They're very, very popular.

In fact, there's one in Skid Row. I thought it was going to last two weeks. It's been there almost three years. It uses -- it gets enough use that it can cool up to two houses.

And, on the right, is the first curbside DC fast charger that we've installed. It's free, for people to use.

Here's a picture of our LAPD. They have a Tesla show car.

(Laughter)

MS. MESROBIAN: In fact, they have two of them. On the right is -- they bought a hundred of those BMW i3s. In fact, they've retrofitted a parking structure with that. The parking structure, by the way, has a 300 kW load, and the EV charging is 500 kW.

In the lower left is Chief Beck, and Mayor Garcetti. And on the right is a BMW i8 police car.

In fact, they told me that they're buying some Teslas for real patrol. That should be very interesting. We'll see how that turns out.

Other things going? I mentioned a Smart

charging demo. To take advantage of our EV discount rate, you have to set up a separate service for the car, and that's a lot of time and expense.

So, we're partnering with some folks that have Wi-Fi___33 chargers, vendors that have Wi-Fi chargers, and they have metering build in, as kind of an opt-in program. Where they can be part of our discount program, where if they -- if they opt into the program, and they have that kind of charger, we'll pay them, at the end of the year, to use that -- to charge at the right time. Now, that's just getting off the ground right now, so that's going to be interesting to see how that turns out.

We have a low-income car sharing program. Again, 200 of our curbside chargers are going to be out there, to support that.

We have an L.A. Green Building Ordinance Change. The State copied L.A.'s Code, as far as when you build buildings, and what you should -- the State -- the current rule is you have to install conduits for future charging.

Well, we're changing the code to make it even more rigorous. We want to actually see chargers at the end of those conduits. And so, that the next version of the ordinance that comes out is going to require actual

chargers on new construction.

We're also investigating a direct install program. We do this for Energy Efficiency Program. We'll go into a business and say, we'll change your lives, we'll clean up your air conditioner for free, and just based on the efficiencies that's gained.

Well, why not do that for chargers? I mean, there are a lot of people, you can throw as much money as you want at them, but you've got to get them off the dime to install things.

Okay, so, what's needed? We would like the CEC to work with CARB, to give the POUs post-2020 greenhouse gas emission credits equivalent to the contribution of the reduction for switching from gasoline to electric.

Now, this is huge. If you talk to most folks, they'll say, we'll, we just won't let it count against you. Well, there's not much motive, incentive in putting hundreds of millions of dollars into something, if you're just not going to count it against you.

The POUs are a little different. They don't make money off investments, off of capital projects. We don't make our 12, or 11 percent. We make money off selling electricity. So, if I build something, it's got to have a payback, and my customers have to pay for it. So, that would be huge for us.

We also, of course, appreciate financial support, supporting the infrastructure.

This is another one for the State to consider; modify the State Building Code to actually require EV infrastructures on new construction. They copied L.A. We're getting tougher. Hopefully, they can get tougher, as well.

That, alone, would result in thousands of commercial chargers installed, at no cost to either the utility or the government.

And, of course, develop partnerships with OEMs, utilities, and others, for education and outreach. That is so huge. It is so lacking and it needs a lot of attention.

This is my -- I don't know if you'd call it the circle of life, or whatever. But it just kind of illustrates, to the extent the utilities need GHG credits, the utilities have the opportunity to provide education, outreach, and the infrastructure support. And, at the end of the day, we're going to have huge greenhouse gas emission reductions.

So, at the end of the day, our program is going to have, in five years, the equivalent of 145,000 plug-in electric vehicles in L.A. It's going to be a visible sign, you're going to see chargers everywhere. There

will be over 10,000 city, and private, and commercial chargers to support the public, workplace, and multi-family, 1,600 electric vehicles owned by the City, and it will support residential charging, and reach our goals for GHG reductions, renewable energy, better utilization of assets and customer savings.

And with that, open it for questions.

COMMISSIONER SCOTT: Great. Thank you, very much, Marvin, for that fantastic presentation.

I have a couple of questions. I'm going to guess that my fellow Panelists, here at the table, do as well. But, maybe, I'll take the lead and kickoff.

On slide 6, you were showing us how EVs save everyone money. And you mentioned that you're measuring it in a cents-per-kilowatt hour, and that the EVs allow you sell kilowatt hours without a lot of investment.

And so I'm wonder, you know, the different types of transformer upgrades, and panel upgrades that you might need, as additional EVs come on line, that even with that, it still has that downward trend?

MR. MOON: Yeah, even with that. I mean, to the extent we've helped, literally, thousands of people get chargers installed in their home. In fact, I have two service planning people, and engineer and a service rep, that meet --

COMMISSIONER SCOTT: Uh-hum.

MR. MOON: -- just work on EV, helping customers. And in all of the residential ones, I haven't had to upgrade a single transformer. And the only transformer I actually had to install, to support commercial, was the LAPD facility, but that's a pretty over-the-top installation.

COMMISSIONER SCOTT: Awesome. Let me turn to our fellow Panelists. It looks like Jim might have a question for you. Go ahead, Jim.

MR. BARKER: Commissioner, do you mind if I just --

COMMISSIONER SCOTT: Oh, sorry.

MR. BARKER: -- ask a questions before I have to run?

COMMISSIONER SCOTT: You go ahead, Kevin, and then we'll turn to Jim.

MR. BARKER: So, just real quick, on slide 4, your recommended case, what's the -- I didn't catch -- maybe that's not a slide. But in slide 4, I have, it starts with GHG emission reduction. What's the timeline of your recommended case? What's that date?

MR. MOON: That was -- that was to reach the 80 percent reduction of 1990 emissions, by 2030.

MR. BARKER: Okay. Wait, 80 percent by 2030 or

80 percent by 2050?

MR. MOON: Oh, 2050, I'm sorry, yeah.

MR. BARKER: Okay. So, you don't -- you don't expect any additional renewables, beyond the 2030 goal, between 2030 and 2050?

MR. MOON: That's an excellent question, sir. About two weeks ago, our City Council asked Water and Power to come up with a plan on what it would take to get to 100 percent renewable. And that's to involve academia, and EPRI, and everybody else to help us do that. So, we're fully anticipating that we're going to have higher goals down the road, if that seems to be the trend.

And that was our next challenge. That's what we've been asked to do.

MR. BARKER: Okay. And then, I believe, let's see, 4, 5, 6, you had a slide 7, that I think you might have added, that I don't have in my slide deck. The next one. Next one.

Just why was 2026 chosen as your resource mix? It seems like a strange date, but maybe it ties to something?

MR. MOON: No, it's not. Well, not for us, anyway. In 2025, we're going to be out of our last coal plant, and that's going to be a huge reduction.

MR. BARKER: Okay, so that's the reason why you chose 2026?

MR. MOON: Right. Yeah, and it's also interesting that, you know, switching from coal to natural gas, and the likes of that, is a 2-to-1 ratio, and transportation's 4-to-1. It's huge.

MR. BARKER: And then, just somewhat of a comment on your "what-is-needed" slide. I thought that was an interesting recommendation, to force EV charging through building codes. And I think it's probably worthwhile to think through, as we also have this goal of zero net energy. What does that mean when you're actually increasing the load on buildings?

And I don't know if that was more for commercial, or if that's also for residential? But that would be something, as we start looking at building codes, to really think about how that impacts zero net energy.

MR. MOON: Absolutely.

MR. BARKER: Thanks.

MR. MOON: Yeah, and you'll also see that -- and, typically, electric vehicle charging doesn't count against your energy efficiency goals, in most cases.

COMMISSIONER SCOTT: Questions from the Panelists? I'll start with Jim Hawley, and then I'll go

to Jim Bowermaster.

Go ahead, Jim.

MR. HAWLEY: Commissioner, thank you. Marvin, thank you for an excellent presentation. I guess my first question is, after looking at all those cool cars that the LAPD has, I want to know how I can get a job with the LAPD.

(Laughter)

MR. HAWLEY: But I, actually, wanted to ask, one is I assume this is also going to be very important in terms of L.A.'s reaching criteria air pollutant goals, and health-based air standards, as well as greenhouse gases.

I've heard, generally, that you need to, you know, embrace electrification in vehicles to hit the health-based standards you have.

I had a particular question on the -- you mentioned Smart charging, and upcoming incentives for that. I was wondering if you could lay out, a little bit more, what you're planning to do, and what your -- what your rationale is?

MR. MOON: Sure. The Residential Smart Charging demo, that we'll be -- that we just started working on, the idea is make it real easy. Again, the whole trick to this is get a lot of cars and get them to charge at

the right time.

And there have been two studies, recently, that showed when our rates go down at 8:00, there's a big spike, just like there's a lot of spikes at 12:00 for some other utilities. At 8:00, our rate gets cheap, and that's when -- and, so, pricing loads are a big thing.

And to get -- our current rate is a discount off the base period, on a time-of-use thing, to get a time-of-use rate. But to get that, you have to wire up a separate service for the car, and that's a lot of money, and a lot of trouble, and most people don't do it.

And, also, you can't offset it with solar. It's got a lot of problems.

So, we said, well, let's -- these new chargers, the price has come down so much, you can get them for $600. They have metering build in, they have communications. Why not use that?

So, in working with manufacturers, and EV installation companies, we said, well, what if we were to partner with them? And we're already giving money for chargers. What if we give a little more money for the Smart ones, or the ones that have this capability? We're already giving a little extra money for those to install the extra metering. Let's put a little extra money in for these Smart chargers.

And then, these people can opt in, they don't have to do the fancy wiring. And, instead of deducting off the rate, off the front, let's pay them at the end, just like those credit cards do, right before Christmas.

And so, I think, it's going to have a great appeal for customers. It's so easy to opt in and say, I'm part of that one. And it will be great for the vendors, too, because if someone has a choice between a dumb charger, or one that pays you money, and it's paid for, anyway, well, go with that.

COMMISSIONER SCOTT: Great. Let's go to Dan Bowermaster, and then John Tillman.

MR. BOWERMASTER: Thanks, Marvin. So, first of all, my sister-in-law and brother-in-law live in mid-City, in L.A. And they have a Honda Fit, and they love everything you guys have been helping them out with. So, thank you.

MR. MOON: Great. Thank you.

MR. BOWERMASTER: My question is about your 18 DC Faster Chargers. Is there any -- that's pretty awesome. Is there any quantitative or qualitative feedback on lessons learned from --

MR. MOON: Yeah.

MR. BOWERMASTER: -- installing the charging stations, usage, utilization, rates, how customers pay,

like, and that sort of stuff?

MR. MOON: Right.

MR. BOWERMASTER: Based on you're a living plug share right now.

MR. MOON: That's a great question. There's a lot that we've learned off that. First off, we've -- most of the City charges are on water and power property. They're not in shopping centers. We've found that those that are trying to site them in these really cool places, have a lot of problems getting site control, particularly, if it's like a shopping center.

So, site control is one of the toughest things. Even working on our City properties, with other departments, sometimes it would take up to a year to get the agreement in place.

The second thing is, of course, our chargers, right now, are free, because it's part of a Smart grid demo project. And, of course, the usage is off the hook. But one thing we found was our model wasn't very good. It was, we paid for the installation, we paid for the maintenance, we pay for the electricity. It's pay, pay, pay. In other words, it's a liability to us. It gets great reviews, no doubt. And a lot of people really rely on them. But it's a bad model.

And so, we've installed 16 with this model, so

the next 12, we're trying a new model. We're going to see - every -- we've learned the value of partnerships. Different people bring different things to the table.

We have a lot of land. In fact, we're one of the biggest landowners in California. Other people have money. I know of an agency that's been trying to site chargers, faster chargers, but they can't get site control. There's another company that installs chargers. Another company that takes care of chargers, on a paid model.

So, we got all four of them together, us and the other three, and said, let's just bring what we have. So, we're providing the -- on these next 12 chargers, we're going to provide the sites, an agency's providing the money, the other agency -- this other outfit's going to build it, and another company's going to operate it.

And, the deal is that there's preferred charging for City fleet. So, we need to support our City fleet, so when they go around, they're not going to run out. So, it's open to the public, the City fleet can use it, and it's not going to cost us a lot of money, from a utility perspective. It's not going to cost a lot of maintenance, and someone's actually going to pay the electric bill. So, that's our new model, moving forward.

MR. BOWERMASTER: Thank you.

COMMISSIONER SCOTT: John Tillman, and then, Shiva Swaminathan.

MR. TILLMAN: Marvin, thanks for your presentation. I found it quite interesting and had a couple of questions.

In one part of the presentation you said the EV car counts for half of a house load. I presume that's probably the current chargers, being around 6.6 kilowatts.

We're already seeing a trend toward, with the recent announcement of the Volt, the Tesla's, of course, and then, eventually, Nissan's larger-range vehicles, we're seeing larger batteries, longer ranges, and larger on-board chargers. We're looking at even 10 kilowatt capabilities on board.

Have you accounted for the increase of the vehicle's battery size and the charger capabilities into your model of what kind of load you will see, and how that might affect the transformers that you haven't, yet, had to upgrade?

MR. MOON: Actually, no. And I'll tell you why, because there aren't any cars out there that actually have it right now, except the Teslas. We do have Teslas out there, and we haven't had any issues at all. Again,

some of those have very large chargers.

It's interesting, with the bigger batteries, it's going to be interesting to see what happens. People are still going to drive the same amount, every day. And so, to the extent are they still going to need their 8 to 12 kilowatt hours a day, or are they going to need -- let's wait until it gets down to nothing, and then charge? It's hard to say. We'll find out.

So, it's going to be a learning curve for all of us. As the cars get bigger, the chargers get bigger, and the likes of that. A lot of it is just how we use it.

MR. TILLMAN: Okay, my second question. Currently, with the DC Fast Chargers, you're going to have demand charges associated with that, issues, potentially. How do you see, going forward, resolving or reducing, potentially, some of the demand charges associated to make a potential business case for this to expand much quicker?

MR. MOON: Oh, that's an excellent question. And it's not just DC fast charging, it's also heavy-duty. All the bus companies, and everyone has said, you guys have demand charges, and they say it to all the IOUs, and everyone has a demand charge.

If you look at the utilities, a snapshot of

different utilities, it's all over the board as far as the impact of demand charges on their electric bill.

Also, it also depends, heavily, on when they charge. Because we have three time periods, 14 hours of the day is the base period, which is the cheapest time.

So, how they use the fast chargers and how they use the heavy-duty vehicles is going to make the biggest difference of all.

So, to help us understand that better, we are part of an initiative, along with some other utilities, with CALSTART, and they've invited some heavy-duty fleet operators, including some bus companies.

And we're trying to understand, better, how they use the car, when they use the car, so we can set up rate structures that are not going to be -- actually, our competition is diesel and natural gas, so we can't be more expensive than that. So, we need to come up with rate structures that support that.

In a lot of cases, we're already there. But it all, again, depends on how they use it. So, we'll know more through this study and we'll use forward from that.

I use an analogy of plugging in ships. Now, this is all very solvable. We had this problem, and Edison had the same problem, over in Long Beach. When the big ships started coming in, and we started plugging

in ships, that was terrible load factor. It would be like 10 megawatts for a few hours, then they're gone all week, they come back, then 10 megawatts. That's -- well, these cars are a lot easier than that, and they're not that big, either.

So, if we can come up with a rate that works for them, I'm sure we can come up with one that works for heavy-duty and DC fast charging.

COMMISSIONER SCOTT: You, Shiva, and then Kapil, and then we'll go to our next presenter.

MR. SWAMINATHAN: Hi Marvin. These are exciting projects. My question is, how much of these are funded by ratepayer funds versus grant, or Low Carbon Fuel Standard funds?

MR. MOON: That's a really good question, too. We take advantage of every grant we can. We just finished up a six-year, Smart grid demonstration project, with the Department of Energy. That was a $120 million program, $60 million paid by us, $60 million paid by the Department of Energy. And that did fund half of our 67 -- it funded half of 67 cars, about 750 chargers, a lot of our DC fast charging, and a whole bunch of other things. So, that was one of the things.

We also have some California Energy Commission grants. CARB is doing the Low-Income Car Sharing

Program.

The rest is picked up by either ratepayer money, or Low Carbon Fuel Credits. So, we're leveraging everything we can.

And we've found that, often, the only way to really get things done is by layering. For example, on the 104 chargers we're installing off the CEC grant, that is only possible with our rebates. And then, we added more rebates on top of that. So, the 104 is actually going to end up being closer to about 220 chargers, in that program.

So, by layering incentives and putting our own money into it, we can really get a lot done.

COMMISSIONER SCOTT: Kapil?

MR. KULKARNI: Hi, Marvin.

MR. MOON: Hello, sir.

MR. KULKARNI: I have a question about commercial charging. Have you looked at level 1 or is it mostly level 2?

MR. MOON: For commercial charging, we don't give incentives for level 1 charging, either residential or commercial. That's just a wall plug. We want to actually install -- give them chargers.

One thing that we've found, of all of the chargers that we've installed, is that it's almost a

wash, at least on the installation side, I mean, to do a 240 versus a 120. So, that hasn't been a -- all we're doing is level 2 and up.

COMMISSIONER SCOTT: Thank you, so much, Marvin, that was a terrific presentation.

MR. MOON: Thank you, Commissioner.

COMMISSIONER SCOTT: While Tim is queuing up Bill, I will mention, Bill, we're at about 10:15. We'll give you until about 10:35, and we'll try to do questions until about 10:45, just so everyone has a good sense of the time. That's the schedule and I want to make sure we get to hear from everybody.

MR. OLSON: Our next speaker is Bill Boyce. He's the head of the Electric Transportation, at the Sacramento Municipal Utility District. And we're also doing a quick switch out of another presentation, before you start, Bill. If you can bear with us, for about a minute.

COMMISSIONER SCOTT: And I'll check and see, as the morning has gotten going, if we have any of our other speakers or Panelists, who are not at the table, and would like to join us at the table, please, come on up.

MR. OLSON: Okay. Welcome, Bill.

MR. BOYCE: Got it. Thank you. Thank you for

the opportunity to present today. In the interest of time, we'll just get cranking away.

IRP, with regards to what we've been doing, we've actually been incorporating our load, since 2012, into our demand forecasting, and resource planning. At this point in time, we do not have as much of a -- I'll say, specificity, of like what Marvin showed.

But we've actually been taking a look at it with regards to input, based on all the market conditions that we can look at. Our current, and we'll show this quite a bit, a lot of the adoption curves.

One thing we're looking at, a little bit more in detail, lately, is Sacramento's about four percent of the State's population. But kind of as a side note, in looking at the market conditions, and the socioeconomic background of Sacramento, even though we're four percent of the State's population, we only purchase three percent of the State's cars.

So, there's things like that, that we're -- you know, even after studying this stuff pretty heavily, for well over six or seven years, that we're finding more details on, as we really get real market data, finally.

So, market adoption that we have is mostly based off of the CalETC, TEA Phase One Study. Most of this work was done by ICF. This, basically, breaks down with

regards to what the rest of the State goals are.

I'll kind of reiterate that, really quickly. The low case line would get State level of about 1.2 million cars by 2030. The mid case line would be up at 2.3. And then, the high case line gets it all the way up to 6 million.

I'll just state this, when we look at a lot of the longer-term ARB Emission reduction goals, somehow the State has to get onto that green line in order to really have a chance of getting to the 2050 goals. And given the slope, as you can see, that's quite a bit of a challenge.

Right now, this shows kind of where we're at on that. Right now, Sacramento is about 4,300 vehicles. We're about 60 percent battery electrics, 40 percent plug-in hybrids. And you can see, and this is pretty consistently -- sure.

(Whereupon, a CEC technician adjusts settings on AV presenting station)

MR. BOYCE: Is about twice of what the original hybrids were, which is pretty consistent with most of the other things going on in the marketplace.

This chart really shows the load profile that we put into our demand, on the forecasting side. A lot of this, when we take a look at it, kind of different than

what we've shown in the past, and the other utilities.

Primarily, at SMUD, we are already starting a migration to all residential customers going to time-of-use rates. So, this particular load shape is what we've found from running two EV TOU type programs, over the last five years. And we've kind of amalgamated them together.

But it shows the fact that we're able to really, more or less, get people to start charging after midnight, a pretty steep curve there.

But right now, and Marvin kind of alluded to this, there's also a lot of other types of technologies that can come along, to really kind of smooth things out.

The one thing I can also say, that we get to, you know, having a lot of Smart charging, that's one thing. But it's really, probably more important, the rate that goes with it.

What we've really found is, probably, the cheapest way to affect load shapes is to really come up with a rate that gets the charging behavior we want. And then customers, on their own, are really able to either program their car, or program their charger, really, take advantage of those rate signals.

And we find that, you know, just that rate, in

and of itself, can do about 80 percent of the load shaping, without having to go to, I'll just say, expensive, managed, or Smart charging.

And we've had two programs, in particular, we ran on our EV Smart Sacramento Program, where we did both direct control from SMUD, and then we also had the customer provide their own control. We got equal, essentially, load performance. And we had customer satisfaction, 90 percent plus, which, in the utility world, is more or less off the chart.

So, in either one of those, it kind of showed us the fact that the rate does its work and, really, kind of the technology can be a lot more agnostic.

COMMISSIONER SCOTT: Hey, Bill, before you go away from that one, where -- do you have a sense of where that summer weekend line would be?

MR. BOYCE: Summer weekend line?

COMMISSIONER SCOTT: Yes, it's the yellow one, but I don't --

MR. BOYCE: Yeah, I can see that. It's not going to be too much different, kind of in between -- in between it all.

Typically, what we see on weekends, is we don't see as much, I'll say, peaking, but we see more scattered charging through the day. And so, what I tend

to think is you would see a little bit more diversity, you know, with regards to -- if you take a look at that winter weekend line, it's a little bit higher during the day, because people are kind of charging in and out. Whereas, in the weekday, they're just doing their commuting. But it's not going to be dramatically different.

COMMISSIONER SCOTT: Thanks.

MR. BOYCE: Load shape, we update that, annually. You can take a look, based on quite a few customers, 220 on our submeter-only TOU rate. We're closing that rate out, currently, based on a lot of that customer satisfaction and cost data. And, really, going to whole-house TOU, with an EV discount.

And as you saw, that really drove that load shape, large discount after midnight.

8.8 kilowatt hours a day, this kind of came -- I think, John Tillman, I would echo what Marvin said, the real charging behavior is dictated by your commuting, not necessarily how big the battery pack is in your car.

So, in Sacramento, 8.8 kilowatt hours, that really corresponds with the average commute distance, round trip commuting in Sacramento. Eight percent of it, I think, is around 33 miles per day. And that's, really, bottom line of what the energy usage is. And,

certainly, with a -- even as low as a 3.3 kW charger, you know, you're adequate to get that overnight, without any issue.

So, I don't have as much on the individual emission reductions. I was glad to see that in Marvin's chart.

With our current activities, we are, as I just mentioned, are adjusting, primarily, our residential electricity rates, at this point in time.

We launched, in April, more or less a free-fuel-for-a-year-incentive, for $300 per vehicle. It's LCFS funded. You'll see that we're going to be upping that in the next chart.

We really started working much more diligently on outreach and education activities. This year, we'll get up to six DC Fast Chargers. Right now, there's three operational. We'll be having another grand opening, in a couple weeks, for one at the Sac Food Coop.

We'll be, also, opening them up at the Sacramento Valley Station, and then down in Elk Grove, at the Nugget Market. CEC helped fund two of those.

Piloting workplace, multi-family, that's been 24 incentives a year. W, actually, see that more as an awareness activity.

And then, we've been supporting other folks with regards to bus proposals. And, lastly, we have been doing off road type activities, truck emission reduction. We're up to, close to 30 stalls at the 49er Travel Plaza. And we only have one truck stop in Sacramento County, so we're kind of there.

And then, also, we have spending a lot more time on truck refrigeration units, and looking at supporting customers with that.

So, 2017, basically, really, cranking up activity. In some ways, I like to think of it, we're almost doubling our program. Enhanced residential program, we'll be up to two years' of free charging.

We're also going to, at that dollar level, evaluate whether people want just more of a cash incentive, versus a free charger?

Our advertising and outreach campaign, we're going to be doubling that with both media and outreach activities.

Of note for us, our big outreach activity, Sacramento Auto Show is coming up in a couple weeks, where we'll get a thousand ride-and-drives in about a three-day time period, which is really good numbers.

I mentioned workplace, multi-family. Right now, we're at pilot level of 24 a year. We're going to be

going up to 200 per year.

DC Fast Charger, we're going to be out of the owner-operator of anything new, and we will be going to an incentive program. Incentive levels are still under development, but it will be significant enough to cover the hardware, and most of the installation type costs.

Recently, with some of the GGRF funding, and some of the things that we anticipate with regards to school bus efforts, is going to be supporting three of the local school districts, in Sacramento.

And then, we're doing some other things, also, with regards to analytical approaches, of how to look at fleet usage, providing assessment tools, where folks can, essentially, gather data. And determine whether, or not, it would be possible to electrify their fleet. We're using that on our own fleet, as well. And then, probably some other public fleets. And then, looking at migrating that to any customer.

Managed research on charging, echo Marvin's. We're looking much more at Wi-Fi type things these days. And then, medium and heavy-duty fuel switching goes with regards to our truck refrigeration units.

We're also starting to look at getting back into the forklift incentive. We actually had a forklift fuel switching program, back in, about 2003, 2004, and

starting to evaluate that activity, again.

A quick snapshot of our fleet. You can see where we're really kind of aggressively planning a lot more activities going out the next five years. One thing that I kind of will point out, kind of interesting, that Class 5 and Class 7 JEMS. I think that's a great success story, when I take a look at things.

But what those are, is it, basically, has an electric auxiliary power unit to run a boom truck, which utilities have. And those have, actually, become very popular with the operators. There are safety benefits, with regards to not having a noisy auxiliary power unit. And, essentially, that Class 7, 8 represents 100 percent fleet change out. Forty-one is about, I think, 75 percent.

So, the fleet operators tell us that when the vehicles go out, in the morning, that those GMs are the very first ones that get taken out of the yard. So, that's become a very good success story.

I know, quite a bit of the Investor Owned Utilities, themselves, are going in that direction.

EVSE, you can see where we're headed with charters. There's quite a bit of an expansion. We've been doing, basically, employee charging on the cheap.

Employees have to pay, but they're paying a flat, monthly fee, and we're doing all of that with non-network charging, and getting, I'll just say, additional employees coming into the program all the time.

Those JEMS, up top, actually charge of 120-volt plugs, so that's why you can see our e-Center Operations facility can really make a lot of charging, with regards to the 120-volt plugs.

So, disadvantaged communities. This really takes a look at nuts and bolts. We're always partnering in this. SMAQMD, Sacramento Metropolitan Air Quality Management District, Sacramento Housing and Redevelopment Agency, has a Share Car project. We're going to be installing a second DC Fast Charger.

Probably, more importantly, we're actually using SMUD activity to generate cost overmatch, to help the other partners in this. So, this is where we're really kind of using our activity to leverage, to support the community.

I already talked about the bus projects, that just puts a number on it. We're, basically, going to be supporting the charging infrastructure.

The other point, if I can go back a chart, or back, all that activity that you see, with regards to the ECOC fleet, ECOC employees, all of that is in a

disadvantaged community. Locally, that's all east of Bradshaw, if you know where the big SMUD facility is, down off that road.

Okay, support for our service providers, that was another question that come up. We've provided letters of support and help to just about anybody that, basically, approaches us.

West Coast Electric Highway, I know we'd supported three of the electric vehicle service providers.

Another program opportunity notice on Queen Fuel proposal, and support provided. I know at least two letters of support.

We've also created a sale for resale policy, that allows outside entities to come in and centrally set up resale of electricity, for electric vehicle applications.

And then, we have created a commercial EV rate, which basically eliminated, or it smoothed out the demand charge issue. But that, really, is for applications that have real low U factors, where there's particularly more DC fast charging, where there can be very high loads, but not much energy.

For more, I'll just say, higher utilization factors probably above 50 or 60 percent. And, actually,

it's probably more beneficial to go on our new, normal commercial rates.

State funding, that was another question in there. I just break it down what we've, more or less, gone through, with regards to going back to the 2010-2011 time frame.

One of the thing we try to do, a little bit, is we don't try to go for all the money, all the time. If you see, we pick and choose the different types of activities. More or less, make sure we don't bite off more than we can chew.

LCFS protected value, to date, is being used to support most of the EV incentives that we showed, back on the 2017 activity. And then, our own, stand-alone funding for other DC fast charging efforts has been more than what we've been tackling with the other factors.

Going back in time, looking at what we've spent. We typically track what cash we've sent and not, necessarily, labor or staff time. Because we've had a long-going program, for 25 years, the amount of investment's pretty large. But in general, a lot of our customer programs are in the, oh, next year we'll be, essentially, doubling in size, to getting closer to around $3 million a year.

Things we see as challenges. Really, one of the

things that we worry about, and this kind of goes to goal setting, is it's very hard to set utility goals for the amount of emission reductions in this area because so much of the market is highly dependent on the vehicle manufacturers. And how much we can actually spur the market, given infrastructure investment, there's not a lot of data out there to really provide confidence that if I put so much money infrastructure, that will cause so much vehicle adoption growth.

We actually plan on looking at that, quite heavily, in the next few years. But, again, a lot of this, the vehicle OEMs are much more influence on the market, than one what we can do.

The low price of oil hurts, obviously. I can tell you, adoption dropped in Sacramento, just slightly in 2015. And then, it looks like it's just ever so slowly dropping a little bit in 2016, so far. But I think we'll have some opportunities, the last quarter of the year, with some of the Chevy Bolt launch causing a little bit of excitement.

One other thing, and Marvin kind of honed in on this, the different business models of the Publicly Owned Utilities, where we're dependent on the energy sales, and not the capital investment. LCFS incentives, to help with the infrastructure incentives, I think, are

very important.

Once again, we're motivated by the energy sales, these types of things where we can turn out the LCFS as a rebate, to get more people charging, to help the market, I think is a general trend. If LCFS, you know, gets weakened, or gets reduced, I think that will significantly hurt the amount of incentives that we can bring to the market.

Also, when you take a look at how much vehicles, and like I said, kind of getting to that green line, this question of, you know, okay, well, is not good to invest in one place? We're going to need all the investment, from every place we can get, in this State.

So, I don't think it's one where we should say, okay, well, VW settlement's coming and, therefore, we don't have to pump any money into these activities, because things like that are going to pay for it all. We really see that as, no. That's only the tip of the iceberg. We're going to need investment across the board to make the State objectives and policy.

Cross-sectoral shift of emissions between transportation. You know, I'll say this is hit and miss. We see everything from, you know, hold harmless, to, gee, we're not sure you're going to even need any additional allowances to cover that TE load.

And, when we hear stuff like that, we get really nervous with regards to, okay, if we don't get additional allowances to help meet some of these, you know, higher loads, given the policy level, then it sends mixed messages on, you know, would we want to invest, because it could be held against us.

So, anyway, you know, depending on which forum, who's talking, we hear every, I'll say, about once a year, some people, oh, yeah, well, you guys won't need additional allowances for that. And that's always of concern, and it's usually not consistent, and usually gets corrected after the fact, but it is a concern.

Summary, I'm looking, and I'm right at 10:35. We do have a long track record, over a 25-year, a continuous program. Our load, for the TE, has been going in, you know, basically, since the modern launch of the market, really, in 2011.

We are going to be looking at, you know, increasing adoption, all the different types of incentives, and getting much more active on that. And as I said, basically, essentially doubling to what we have been doing.

Underscored, again, I think just the whole space is going to need a lot more funding to help meet those State goals. You know, right now, beyond Federal and

State Government grants, and even LCFS, we've got quite a bit of incentive going in.

And then, once again, that LCFS funding, we see, as pretty vital. I think, even more so, on the medium and heavy-duty, where a lot of that infrastructure's a lot costlier than, let's say, the residential charging.

And then, once again, accounting for the CARB. And I think it would be really good to get some strong policy, consistent, written down and, you know, that can certainly help put more of a green light in front of the utilities.

That's what I have.

COMMISSIONER SCOTT: Thank you, very much, Bill.

So, I'm going to queue up questions. I see them, already. So, I'm going to start with Jonathan, and then go to Amy.

MR. CHANGUS: Yeah, Bill, that was a phenomenal presentation. And I don't know if it's really a question, as much as a comment, is that your slide 13, I think, is rich with information that NCPA would strongly agree with, as far as looking forward and the support we're needing, as policy clarification, especially with regard to LCFS. And, later on, post-2020, as LADWP mentioned.

That's foundational concern about how we can act

early on, but not then be penalized or not credited, later. So, that's -- strongly endorse that slide.

COMMISSIONER SCOTT: Great. Amy?

MS. MESROBIAN: Hi, Bill. You were mentioning about $900,000 in LCFS credit revenues. Are you guys generating credits on behalf of your residential and commercial customers, and selling them? Can you just explain a little bit about how --

MR. BOYCE: Right now, that's all based off the residential activity, ongoing. Yeah, we will be collecting energy usage data. We have not done a lot of commercial activity, so there's been no credit collection in that area, to date.

MS. MESROBIAN: Great. Yeah, I was just curious, in the kind of spirit of IOU/POU collaboration. The IOUs are doing the same thing, now, they're generating the credits on behalf of their residential customers. But one thing we mentioned, in our SB 350 guidance, is that they can look to help generate or facilitate credit sales for their commercial customers, as well.

MR. BOYCE: Yeah, the other one, I'm aware of, just in Sacramento, I mean, we do have some large users, like our Regional Transit, are also opted into the program. So, we find it is really kind of a function of

kind of the size, and the knowhow, and sophistication of the commercial customer.

MS. MESROBIAN: Thanks.

COMMISSIONER SCOTT: I had a follow-on question to the LCFS, and then I'll turn to Jim.

Which is that, you mentioned, especially, maybe as you get into the medium and heavy-duty space, that the LCFS funding will be able to support the future infrastructure investments.

And I was wondering, so, are you taking some of -- it sounds like some of those funds are going kind of directly to the customer, in terms of the free fuel that you mentioned a few slides back. And then, some of those funds are going to help support the infrastructure investment? Or, how are you envisioning that?

MR. BOYCE: Okay, the way we really have kind of envisioned LCFS, one of the best ways to help the market is, really, kind of a role the utility can play, which is to look at what the value of the LCFS is over a period of time.

And I hold my hands out here. So, for on the -- you know, anywhere from three to five years. And then, what we have been essentially doing is, okay, how much of that can we aggregate and provide as an up-front incentive?

And so, in the residential market, when chargers are, you know, cheap, they're $500, or $600, now, and people can install them on their own, so to speak. It's a nice incentive, don't get me wrong.

But it's really, when you start getting into the larger, you know, types of commercial or, you know, medium and heavy-duty vehicle, where it's not a $1,500 investment, it's a $50,000 investment.

And so, taking a look at ways where we can aggregate the credits and, you know, over a period of time, knowing that the usage will be there, and then, you know, providing an up front.

One of the things, and I think the Commission could really appreciate, is this really is kind of how energy efficiency rebates are done. You take a look at what the energy savings will be for the first five years. You know, you put that on an escalation factor, right, and you do a net present value of what that provides you up front, and then that's how we determine what the energy efficiency rebate is for a normal.

So, we're just using those types of normal utility processes to create that. LCFS really provides us that. The medium and heavy-duty vehicles, because, like I said, the infrastructure's going to be a lot more expensive, those are going to be a lot more important to

help offset that cost.

COMMISSIONER SCOTT: Thanks.

Let's turn to Jim?

MR. HAWLEY: Thank you, Commissioner. Bill, nice presentation, thank you. Had a question, you mentioned that you're looking at, in terms of the residential, sort of a free charger option versus a, you know, free charging option.

I'm wondering if you could sort of further describe that project? Will consumers, for example, have a choice of the chargers that they can try?

And then, I guess, I had a second question, as well, on fast charging. Which is, I see you're going from a direct install model to one that's focused on incentives. And I'm -- you know, there's already a fair amount of investment going along in, for example, on the I-80 corridor, on fast charging. I'm just wondering if you can give us a little further elaboration in terms of how you see your incentive program for DC evolving?

MR. BOYCE: First of all, back to the residential. We see that the customers will, basically, get to opt in for a, you know, the free fuel for two years, or a charger.

Right now, we're discussing whether or not we would procure two or three different types of charging

equipment. The planning on that's ongoing. I could tell you, we're probably leaning towards just purchasing a single charger.

The fact that the customer has the choice to either take the cash incentive, or get the charger, we feel is pretty much enough choice. Essentially, with the $599, they could also go out and buy their own charger for that. So, that's the flexibility.

We also tend to like only having to buy one for just making, essentially, we would like to go out with a mass buy, and get economy of scale, so we can get better pricing on that. So, I would say we're going to be leaning towards just purchasing a single type of -- a single design charger.

Back on the DC fast charging. You know, we have been doing a lot of that in high profile public areas. Marvin kind of mentioned this, we've run into a lot of headaches with regards to property control, property rights. We find that that tends to be the most expensive and longest lead time.

Going to an incentive model, what we hope to do is, essentially, have the property owners, themselves, opt into those types of arrangements. So, instead of really having to work with property owners to do this, only this way the property owner that wants to put stuff

in will come to the table, on their own.

And, you know, the property control that they bring will, essentially, make it more cost effective to get these things in the ground.

So, that's kind of the motivation for why we're going in that model. And we're looking at pretty significant incentives, like I said. One of the things we're really looking at, now, will be for 50 kW fast charging. Not really interested in the 25. We're really looking at, you know, getting it public.

In the data that we see, you know, folks want to recharge as fast as they can. And anything that slow that down, you know, we're just trying to meet what the market demands are.

COMMISSIONER SCOTT: Excellent. Any other questions from our folks around the table?

Okay, thank you for a fascinating presentation, Bill.

I'll turn it back over to Tim.

MR. OLSON: Okay, so, our next speaker is Kapil Kulkarni, who's the Electric Vehicle Program Manager for Burbank Water and Power. And thank you for being here to make that presentation.

COMMISSIONER SCOTT: Yes, thank you, very much. Welcome. So, we've got you from about 10:45 to maybe

about 11:05, or so. We'll save that next 10 minutes for the questions from the Panel, and go from there. Thanks, Kapil.

MR. KULKARNI: Hi, everyone. Kapil Kulkarni, from Burbank Water and Power. Thank you, Commissioner Scott, Tim, and CEC staff, for inviting me to present on BWP.

I just wanted to go through and summarize my goals for this presentation, based on the questions that the CEC had raised for this workshop.

An introduction to Burbank, what we've achieved so far, what our current status is, in terms of future plans, as well as by subsector. And then, what the impacts are on our utilities operations. And then, some next steps and recommendations.

A little bit about Burbank. We're 105,000 residents in 17 square miles, about 10 miles northwest of downtown Los Angeles. We've got about 45,000 households. Within that are about 500 EVs registered to those households. So, about one percent penetration.

But as you can see, most of our load is commercial, about 75 percent. A little bit of foreshadowing for what I hope to present later on.

So, what we do know is that we have 105,000 residents. There are about 100,000 employees coming

into the City, each day, possibly to work at one of the large studios, Warner Brothers and Disney. As you can see, the 41 extra-large commercial customers are 26 percent of our load.

And we haven't done as much of a job, as we could, getting those -- getting those customers to -- first, to survey what is going on at their properties with regards to EV charging, and then figuring out what their needs are.

But now that we've kind of addressed public charging, which I'll get to in my achievements section, we can look more at what we need to do as far as commercial charging.

In terms of our energy supply and greenhouse gas emissions profile, we're similar to L.A. We have an investment in the IPP coal plant, in Utah, which we hope to get off by 2025. And we hope to achieve any increases in load growth from energy efficiency, and customer-sited rooftop solar.

So, that's the blue line at the top. You can see that load is projected to be pretty flat, starting pretty much now, 2015 and on. But because of the push to 50 percent RPS by 2030, energy efficiency and solar beyond that, as well, that our GHG emissions intensity goes down by about half, past 2030.

And this is part of the City of Burbank's commitment to climate change mitigation efforts and greenhouse gas reductions. In 2007, we were the first City in America to set a target of 33 percent RPS, which we hope to achieve by 2020. And we're pretty much already there, at that point, around 31 to 34 percent, depending on how you measure it, and what you're looking at. So, we'll easily achieve the 2020 mark, and then still push for the 50 percent by 2030.

And our general plan for the City, Burbank 2035, outlines additional, long-term emissions reductions goals, including 15 percent reduction from 2008 to 2020, and 50 percent to 2035.

So, we see the goals of SB 350 being consistent with what the City of the Burbank has already outlined with regards to RPS, GHG emissions, and transportation electrification.

And you're probably all familiar with the California ISO duck curve. This is what it would look like in Burbank. You can see, the duck is represented by the dotted line at the top, and then the blue line at the bottom, which represents utility supply. And just kind of the mismatch that, you know, could be going on between the supply needs of our customers and what the -- or, the supply of the utility and the demand from

customers.

So, in the morning you have minimum power requirements from the utility and you have, you know, increasing demands from the customers as they wake up and start using electricity. As the day goes on, rooftop solar starts generating and producing more than what the utility customers can use.

So, we see a real opportunity here for workplace charging to fill in the gap between demand and supply.

And in the evening, you have the problem with the quick ramp up and decreasing production from solar, and having to, you know, apply peak period rates, or other incentives to shift that load to later on in the day.

This slide goes through some of the achievements that we've done so far, in terms of we started our EV charging program in 2011. There's a -- it might be hard to read, but parking lot chargers created an initial charging network in 2011, using DOE grant and ChargePoint as the equipment in Back Office Provider.

And this was kind of our initial foray into EV charging. We wanted to see how customers would react to it. And we thought of it as an additional service to provide to our customers. We provide electric, water, and fiber services. So, we thought of EV charging as

just an additional service that would help our customers in terms of their needs to work, and live in Burbank.

Based on the success of that, we expanded the charging network in 2015, using a CEC grant to pay for curbside chargers. Which is we put in a dual charger, like the one you see in this picture, in front of the Buena Vista Library. Two cars can charge at one time. We put them at eight different locations. The total project cost was about a hundred and -- or, sorry, $215,000. The CEC paid for about two-thirds of that. And it just more than doubled the number of public chargers in Burbank, and provided additional options for customers. Such as the multi-family residents that live across from that charger.

Whereas, the previous parking lot chargers were mostly downtown, and used by more destination chargers, or people that happened to be going to an area where they could charge.

The curbside chargers kind of turned that around and brought the chargers more in neighborhoods, to where anyone could use them, whether they're a multi-family residence, whether they're driving off the highway and just need a quick place to charge, or whether they are going to a destination close by the curbside charger.

And the other components of our EV program, we

installed our DC Fast Charger through another grant that came through -- that came from the CEC to SCPPA, where some of the SCPPA members installed at least one DC Fast Charger in their territory.

The DC Fast Charger has kind of added more features and more complexity to our program, just in the fact that, in the last few months, when the charger was installed, has become our most popular charger. So, from that, we can tell that, you know, customers, they don't want to wait, you know, an hour or two hours for a level two charger. They want to be able to use a DC Fast Charger right now. And they'll, you know, leave comments on Plug Share, if somebody's messing with their charger, or if somebody is parked there for five minutes too long.

So, we see an opportunity, there, to try and put in more DC Fast Chargers, similar to what SMUD and L.A. are doing.

But the issue that, you know, everyone's kind of addressed is the capital cost and just the install cost of putting in DC Fast Chargers. And that's not, necessarily, the best approach in every situation, but we're looking at other funding mechanisms to help pay for this, and be able to put in more of these.

And the other thing with DC Fast Chargers is

that we do have an ordinance that allows private companies to come in and resell the energy we provide them, to put in level two and DC Fast Chargers in a public area. But, as of now, pretty much all the chargers, you know, 95 percent of the ones in Burbank, that are public, are utility-owned and operated.

So, we allow other companies to come in but, you know, having utility control of it makes it easier for parking enforcement, because the City can do that. It makes it easier for the utility to pay for the chargers and recover the capital costs by making upgrades, where they're needed, rather than depending on -- rather than the revenue, or the ownership of the machine to go to a private company, and just for additional customer service.

You know, the more DC Fast Chargers we put in Burbank, the more energy's being used, and providing benefits to our customers.

And then, the other parts of our rebate program. TOU rates, since we've installed the parking lot chargers, in 2011, we also developed a time-of-use rate for residents that purchased or lease an EV, and wanted to charge at home.

So, it's a very beneficial rate, 8 cents per kilowatt hour, off peak. But, as others have mentioned,

this may change in the future as we have more information on when the chargers are being used, what our portfolio mix is at the time, and when we have additional supply available to be able to provide super off peak pricing, or kind of midday off peak pricing.

And then, so, we have about 125 customers on the TOU rate. It's an optional rate. But if you do get a rebate, which we also provide, then the TOU rate is mandatory. So, we don't want to give or provide rebates for home chargers, and then not have the customer charge at the right times.

So, we've had about 50 rebates go in, since the program started in 2015, $500 for residential, $1,000 for commercial. But, based on what Marvin mentioned, you know, if they're offering $4,000, we may need to up that, as well, especially if we want to encourage commercial charging, and you know, incorporating it into our utility operations.

So, based on that, the capabilities that we have, we've done public charging, we've offered other components to our customers for rebates and time-of-use rates. And we can either put in these chargers or help out with planning and permitting, whether it's internal or third-party installation.

We also have full electric AMI, so we have the

ability to monitor usage without expensive networking options. So, and I'll talk about that later. We see that as an opportunity to bring down the cost of EV charging, whether it's public or, you know, customer sided. But at the same time, provide the same level of service.

Now, the challenges that we face are incorporating EV-related load into our utility operations, and making sure that, going back to the slide I showed before, in terms of the duck curve, that we're promoting charging at the right time.

And at the same time, balancing the promotion of transportation electrification with our internal mandate, as well as State mandates, to provide reliable, affordable, and sustainable electric service.

So, reliable, we're an APPA Platinum Reliability Provider, 99.5 9s reliability. Affordability, among the lowest rates in Southern California, especially among other POUs.

And it's sustainability, our City's set an internal target of one percent energy efficiency as a percentage of sales, which we've been achieving for the last five, ten years. And trying to plan that out for the future, as we incorporate more EV charging.

And then, competing funding priorities. So, you

know, public benefits charges, having to spend that money on energy efficiency, low-income, RD&D, and renewables. But also, having to achieve transportation electrification goals using some of that funding, or additional funds, as it becomes available.

So, I'll start with what we have achieved and are planning in the future. Fleet vehicles, we have five battery-electric, and some plug-ins, as well. And our goal is to replace vehicles, you know, ICE, internal combustion engine cars, as feasible. So, any new car that comes in, must have a plug, for our fleet.

We don't have a fleet the size of L.A.'s, but it's pretty substantial, and it kind of shows our employees that, you know, they can do their job, while still using a car that's good for the utility and good for the City of Burbank.

Employee charging, we have six level one outlets in one of our employee parking lots. And we plan to install additional ones, as available.

And one of the things we plan to do is provide the Electric Car Insiders EV Buyer's Guide to all of our employees. We think it's the best guide out there, that tells, you know, consumers about all the different cars out there. You know, it was definitely helpful for me, when I got my LEAF, which my son is climbing through, as

you can see in the picture. And it just provides a comparison.

You know, if you provide customers with the information, whether it's at a Ride and Driver event, or other customer event, they'll take the time to go through all the different EV options that are available, now, versus two or three years ago, especially with the Bolt and Model 3 coming online. And make it easier for them to purchase or lease an EV.

So, if you get -- if you spend three bucks on one of these issues, and you get one employee to consider or purchase an EV, I think that's a really good investment.

And then, also, something we're planning with other POUs, including Glendale and Pasadena, our neighboring POUs, is an EV Ride and Drive event. So, we know that our customers are kind of loyal to the Valley. They're not going to drive over the hill to go to L.A.'s big, Ride and Drive event, in September. So, we want to bring an event to them.

So, we've been planning something, either late this year, or early next year, at one of -- at an area in Burbank, Glendale, or Pasadena, in which we can bring manufacturers, or other residents, with EVs, and make it -- you know, show them what the three of our utilities

are offering in terms of rebates, time-of-use pricing, as well as all the plug charging that's now available, as a result of CEC grants, or coordination through SCPPA.

This is kind of our strategy for public charging. I've kind of gone through, you know, what we've done so far, 27 level two chargers, one level three charger. And, for a city the size of 17 square miles, mostly suburban and urban, and very -- you know, very highly populated and filled in, we feel that this is pretty good coverage. And we plan -- we will install additional chargers, as we see fit.

Obviously, the advantage of these public chargers is that we can monitor the usage, and submit for LCFS credits. The disadvantage is the initial capital expense. So, we've been fortunate to get grant funding from the CEC and the DOE to pay for this. And in the future, we may try other approaches, such as using LCFS funding.

And if you ignore the initial capital expense, the benefit cost works out for the benefit of the utility, based on -- you know, I think each charger uses about 800 kilowatt hours per month, which is higher than our average home uses in Burbank, even with the high air conditioning load. So, we get pretty good revenue on

that.

The maintenance is also something that needs to be worked out. You know, if you have one call per month, that could be an hour's worth of some electrician's time. And some of the providers, including Greenlots, have been updating the equipment to where the -- if there is a fault in the equipment, it can be reset remotely. So, that's something that we hope will bring down the maintenance costs over time.

And then, the electricity cost is really low and will continue to decrease as we have more renewables in the system.

The target market for this is pretty much anyone coming to Burbank. And some of the next steps that we have are just installing more chargers and making it more efficient.

So, if we're going to upgrade the transformers, or do some trenching in one area, we might as well put in as many chargers there, as we can.

So, the Curbside Charger Program was great to figure out if we could do this in the public right away. And, in the future, we may decide, can we put in four chargers at one location? Can we put in six? And just have the majority of the costs limited to the infrastructure, rather than the actual chargers.

For residential, single-family, this is probably familiar to most of you, in terms of what the benefits are. You know, if we provide rebates, then it's limited to our rebate cost. It's still an issue for the customer to figure out if they need to upgrade their service panel, or additional installation costs related to where the charger is located.

But, you know, we could also -- if we find that -- so far it hasn't been an issue, but if we find that it is, perhaps we can provide LCFS funding as a benefit to these customers, as well.

The disadvantage is mainly on the customer side. So, we want to make sure we understand what the kind of challenges are for the customers to install these. Because we feel like, in the future, if every household has, say, a battery-electric and a plug-in, they're not going to be able to level one charging for both cars, so you'll need a level two. And, I guess, the load -- the usage of those chargers will depend on what incentives we can provide.

So, we don't want people to charge just in the middle of the night, which makes it hard to charge two cars, but to be able to provide, you know, some charging during the day, based on the rates, and electricity portfolio mix.

And just some metrics on benefit cost. Average charger usage is maybe 8 kilowatt hours per day, 3,000 kilowatt hours per year. When you discount that, it comes out to about a 3-to-1 benefit cost ratio. So, you know, equivalent to energy efficiency in terms of how we look at it and, also, you know, how we would approach setting the rebate, or promoting this program in the future.

And the same thing, in terms of next steps, continue promotion of rebates, which is very economical, and monitor customer satisfaction with having to install the chargers, themselves.

This, we see, is kind of the big opportunity, level one and level two charging at multi-unit dwellings and employers. You know, we're still looking into, you know, what -- the number of level two chargers at different commercial workplaces.

So, we want to make sure that there is a mix of level one and level two. But we see level one as an opportunity, just based on the long residence time, the excess of solar power during the day, and the fact that these cars are already parked there for most of the day.

We just need to provide the infrastructure or help the commercial customer install it or, say, give them one charger, help them with the equipment upgrades,

and make it easier to meet the supply and demand mix of the utility, while at the same time not increasing the charges for the commercial customer.

And the same thing that Marvin mentioned, in terms of building codes, working with the City to make sure that we can require EV infrastructure at each new, or retrofitted MUD, or commercial property.

Maintenance, I touched on this a little bit, but right now it's pretty reactive. You know, we kind of can tell when the faults are occurring, and we have to send someone out, or have it reset, remotely. With AMI meters, if it turns out that we can use those to find out when the faults are occurring, or when the units need to be reset, then we'll rely on those in the future.

And so far, based on kind of the load penetration, it hasn't been an impact on distribution operations, kind of the same thing that Marvin had mentioned. But we do require all EV chargers going in, to go through and get a permit and plan check, so we know exactly where they're located, and what additional requirements we'll need on our system.

And, also, wanted to go through the rates. I think we have a pretty good rate structure in terms of how we incentivize customers to install EV chargers and

to drive EVs. For a single family, they can continue on the tiered rate, but if they have an EV, that wouldn't make much sense. So, we provide them with a voluntary rate, if they're not getting the rebate for the charger or, if they are, then it's mandatory.

But it's a really good deal in terms of 24 cents peak, so good incentive not to charge, and then 8 cents off peak.

For multi-family, customers have a few different options here, based on if it's for the whole home, and if it's connected to their individual, multi-family unit. Or, if it's a multi-unit dwelling with common service, and whether it's a residential kind of billed account or a commercial account.

But most of our, pretty much all of our commercial accounts will be on TOUs starting January 2017. So, that will be additional incentive to get EVs, either now, or after that date.

For commercial, you know, if any commercial customers get rebates, now, or have EVs, then it's all part of their existing service. But in the future, and I know Anaheim is looking into something like this, in terms of utility owned and operated charging at the customer site, then we may look into that, as well. And providing an EV charging rate that more fits in with

what our actual costs are during that time.

For the public chargers, we feel that these are pretty good rates in terms of, you know, showing the true cost of energy between 4:00 and 7:00 during the summer, both for level two, and then level three, which has the demand charge kind of built in to the kilowatt charge. And making sure that customers are paying for the energy and demand involved in these chargers.

This one kind of shows the different actual charging rates. And it can be kind of thought of as like a heat map, or a daily load profile. So, obviously, during the peak time, between 4:00 and 7:00, that's when we're going to have higher rates. And then, off peak, kind of lower rates.

But then, there's a real disincentive to customers to use the public chargers off peak, which is probably what we don't want, anyway. But it could change in the future, if we decide that the real cost of energy at that time is, say, 5 cents, which is why the residential rate is set at 8 cents. So, maybe we need to revisit those in the future.

But, you know, putting in -- putting in rates for public chargers is still a little onerous, as opposed to having it in the billing system. So, we're looking into ways to kind of make it easier to set the

rates and make it more dynamic.

In terms of the forecast going forward, we've taken -- we've looked at the State forecast, we've looked at a forecast developed for us by a consultant, and we kind of see similar things in terms of just the huge increase in the number of EVs over the next ten years.

So, right now it's around 500, increasing to about 3,000, by 2025. And, you know, we want to make sure that we stay kind of ahead of the market, in terms of the number of EVs, as well as look at what the penetration is, in neighboring areas, to make sure that we're more consistent.

This is our budget, going forward, for our different EV initiatives. Rebates, we plan to double them, or we've doubled them for this fiscal year, starting July 1st, 2016.

And then, kind of the public charging versus public/private infrastructure, putting more money towards kind of in front of the meter, or next to the meter charging, and then making use of grants, as well. So, I'll more about this public/private infrastructure in a second, as well.

In terms of charging partners, we've -- we'll work with any service provider that can benefit both the

utility and our customers. And this is kind of showing the similarities and differences between the two that we've used so far, ChargePoint and Greenlots.

Greenlots has been a partner, through SCCPA, for the last couple years. So, it's been very easy to work with them, and working with SCCPA to bring the price down, and to get billing discounts.

This is kind of our newest project. It was inaugurated on Monday, at the Hollywood/Burbank Airport, the main airport serving Burbank, Glendale, and Pasadena, which is run by those three cities' Airport Authority.

Six level two chargers located in the Valley area. The cost for the charging service is $5.00, on top of the Valley parking fees, which is about $24 per day. So, you know, you may park there for four or five days, but when you pick up your car, it's only $5 for the charging, and your car will be fully charged when you drive home.

So, for this, PWP managed the project, paid for it, and the chargers, themselves, will designed and installed by Greenlots. And they will now be maintained by the Airport Authority. So, we paid for them, the Airport now owns them. This was done at a cost of $4,000 per charger, which is a very big drop from the --

both the parking lot chargers that we installed, and the curbside chargers. So, we kind of see this as a model going forward. You know, we put in the conduit, you know, we provide the chargers, or the owner, the site owner pays for the chargers, and we're able to monitor through a VWE (phonetic), measuring data every 15 minutes in terms of kWh and voltage.

So, that kind of goes back to the public/private infrastructure. Before, we were mainly just doing rebates and public charging. Now, we're looking into more projects, like this, to where there is kind of public/public/private intersection, and making sure that the cost goes down, there is additional services for residents, for people that use the airport, and for our customers, as well.

And I just wanted to close on, I mentioned workplace charging before. Just based on information from the ISO, we feel that our efforts to promote workplace charging, increase it, kind of dovetails in line with what the ISO is assuming, in terms of having a super off peak period, you know, during the spring months, and kind of non-summer months, during the daytime. And making sure that the chargers are available, the rates reflect that, and that we are doing enough promotion for our customers to make sure that

they're adopting EVs and installing chargers.

How's that on time?

COMMISSIONER SCOTT: Great, thank you.

MR. KULKARNI: Thanks.

COMMISSIONER SCOTT: I'm going to just take the one question I see from John, and then we'll turn to the next presentation. Go ahead, John. Unless, Kevin, did you have any questions?

MR. BARKER: Just one question that might be interesting to hear from the other POUs, as they make their presentations. I didn't see it in SMUD's.

So, it looks like Burbank is looking at doubling over the next five years. It just might be interesting, for the other POUs, to what do you see over the next five years, when you make your presentation. That's it.

COMMISSIONER SCOTT: Okay. Great. Go ahead, John.

MR. TILLMAN: Thanks for the presentation, it was quite interesting. I did have a couple of questions. The EV registration ramp rate you showed, is that 3,000 per annum or 3,000 aggregate EV registrations in the City?

MR. KULKARNI: That's 3,000 aggregate.

MR. TILLMAN: Aggregate.

MR. KULKARNI: Yeah.

MR. TILLMAN: When you make that, have you given consideration to the recent passage of SB 32, and the ZEV Mandate, and the requirements for registration in the general population is quite a bit higher. So, if you have 100,000 people, it's expected, by 2030, if the numbers are met, 20 percent of the population will have to have EVs. So, you might want to consider that in your population growth of EVs.

MR. KULKARNI: Right. Yeah, that forecast is a little bit -- in a little bit, we will probably need to look at it kind of quarterly, and just based on the additional cars that are available.

MR. TILLMAN: And given that you -- the second question that I had, a large percentage of your electric usage is by your very large users, commercial users. I'm presuming the studios, and so forth.

Have you forecast any concept of having a large number of workplace chargers, a program that incentivizes workplace chargers, given the amount of new chargers in the marketplace, and the size of the commercial population that you have?

MR. KULKARNI: Yes, definitely, one of the thing we want to look at is kind of surveying these large commercial customers, figuring out how much space they have, you know, what mix of charging infrastructure they

need, whether it's level two, level three, or level one, and just kind of working with them, more, to make sure.

And, you know, these studios have a lot of other things to consider, in terms of their -- the movies they're making and operations. So, we feel like, you know, we need to work with them closer, to make sure that they see this as an opportunity for their employees, as well as for any of the visitors to their lots, as well.

COMMISSIONER SCOTT: Great.

Go ahead, Jim.

MR. HAWLEY: I'm sorry, two very quick questions. It looks like you're sending out your own electricians for issues of maintenance, if I'm understanding. Have you looked at using third parties to handle issues like, you know, remote maintenance, and repair of facilities? That's the first question.

The second question is you mentioned DC fast charging has been very popular. Are you getting any reaction on the 50 cent per kilowatt hour rate at the prime time? Is that affecting that acceptance?

MR. KULKARNI: Actually, no, for the 50 cents. It seems like they're okay with it. Especially, compared with some of the other private charging networks that may charge, I think, 49 or 59 cents per

kilowatt hour, on top of additional fees.

So, so far, no complaints. But, yeah, I guess all it takes is one person to complain to, say, a City Council member. But it's something that we, I think, will continue to look at, as we have more data on usage, and try and match that rate to the supply at the time.

In terms of maintenance, we had ChargePoint maintain the initial chargers that we installed in 2011, just because it was part of the contracting and more of what the market was looking at, at that time.

Since then, our electricians have gained experience, in terms of how to service these chargers. But at the same time, if we have 100 public chargers in five years, it's going to be hard to maintain all of them, so we might rely more on third party, you know, as we get more data from the current public chargers, and as we have more of them out there, in the future.

COMMISSIONER SCOTT: Terrific. Thank you very much for an excellent presentation.

I will turn it back over to Tim.

MR. OLSON: Very good. So, the next presentation is actually two people. Shiva Swaminathan, who's with the Electrification Division of Palo Alto Utilities, and Jonathan Changus, who's with the Northern California Power Agency.

And let me bring up your presentations.

And we have -- we had changes to this presentation, and I have new handouts, for those in the room, if you're interested in that.

MR. SWAMINATHAN: Thank you. Thank you, Commissioner Scott. We're learning quite a lot. So, Jonathan and I will be presenting, probably, a smaller municipal utility perspective.

Many of the things I heard today, we don't do. We are a small utility, probably 2 percent of L.A., or 10 percent of SMUD. We are probably the same size as Burbank.

So, we'll talk about the community and then the -- how we, as a City Government, operate collaboratively with other departments to encourage EV charging. And then, how do we incorporate this into our planning process.

So, we are an electric, gas, and water utility. We have about 65,000 residents, and about 70,000 to 100,000 folks driving into town, every day.

We have about 25 square miles, about half of it is power plants. So, the urban area is about 12 square miles. $200 million of revenue. And since, because -- since we are electric, gas, and water utility, our meter reading operations is collected pretty efficient and,

therefore, we do not have Smart meters. We have a Smart meter pilot, but we do not have Smart meters, currently. We're hoping by 2020 we'll get then in place.

We are a 100,000-gig utility, and 80 percent of our customers are commercial.

We have a relatively low retail rate, 12 pennies, and we have all our carbon supply comes from -- all our electric supply comes from carbon neutral supply. So, any incremental energy use, due to electric vehicle, comes 100 percent from renewables.

We are different. We are in the Bay Area, so we have a milder climate, so that means something for electric operations. We are an engaged community, high tech, different needs. So, we are a little different. And we're small.

So, I wear the energy efficiency hat, the electric vehicle hat, the Smart grid hat. And so, today, I reluctantly agreed to come here, because that's only 5 percent of my job. So, that's why we rely on NCPA and, for that matter, a Bill Boyce. And so, we collaborate with our bigger partners to learn and apply effectively within the community.

And so, since we are electric, gas and water utility, we have control of all three utility operations. And the City Council drives -- a big

priority is to electrify natural gas appliances, as well. So, approach is not just for electric vehicle, but also, natural gas appliances.

This illustrates our electric greenhouse gas emission communitywide. So, we have, in red you have transportation, in blue you have natural gas, in green you have electric, and the others are City operations.

So, since 1990, we are down 36 percent. Primarily, with carbon neutral electric supplies. So, about 65 percent of the remaining emissions come from transportation.

So, we estimate about 1,000 gasoline vehicles, if we take them off our -- the street, we will reduce our community transportation-related emissions by one percent.

So, this is our carbon neutral supply portfolio. About 50 percent hydro, 50 percent renewable supply. An incremental piece -- since hydro is limited, an incremental piece would come from 100 percent renewable.

As a small utility, operating within NCPA pool, and within the larger Cal ISO we are able to get here. That doesn’t mean hour-by-hour we are carbon neutral. But it’s we’re able to procure supplies.

So, we already dealt with our 50 percent renewable goals by 2017. In addition to the broader

portfolio, larger portfolio of centralized power plants, we also have a local solar goal of 4 percent. We have an energy efficiency goal of 7 and a half percent, over 10 years. We have a demand response program. And we also have high aspirations for electric vehicle adoption.

And I think I missed it in the last slide, our community accounts as an aspirational goal of 80 percent reduction by 2030. How we plan to get there, we don't know, yet. But this aspirational goal sends a message we are serious about it. And we are 40 percent, almost 36 percent on the way.

So, as I said, the major focus is electrification as a whole, both in buildings, from natural gas appliances, as well as transportation.

So, the Council approved a work plan, in 2015, to encourage heat pump technology, for heat pump space heating and heat pump water heating in the residential areas. And also, through Building Code, to support the electrification effort.

We have Reach Codes, which sets energy efficiency, or building energy consumption 10 percent below the State code. And anyone, who wants to fully electrify their home, are exempted from that Reach Goal, additional energy efficiency requirement.

We're also looking at additional retail rate options, but as a public entity, we have to conform with Prop. 26, which means all rates have to be set based on cost, and we cannot particularly provide additional incentive which harms another customer. So, we have certain limitations we need to operate within.

So, three departments within the City are working together to encourage adoption. I'll talk about each one of them, and then most of my presentation will be on the utilities. But, it's a three-pronged approach.

Our Buildings Department, new building, new major renovations, and new buildings have to have either, depending on the size, EVSE-ready, or actual EVSE should be installed.

There are enthusiastic residents in town, who, they want to kind of allow their own chargers to the public. So, they want, and so we are trying to get permits to allow the residents to actually open up their EV chargers to the public.

So, some of these chargers are on the planting area, on the street corner. So, trying to -- so, we have enthusiastic community, so trying to enable them. And then, over-the-counter easy permitting for EVSEs. So, that's in terms of our Building Department.

Also, our Planning Department, when they approve large projects, building projects, as part of the public benefit requirement within those developments, they require free public charging in some of those areas.

So, example, there's a new development next to Caltrans Station, Palo Alto, that new building has put in a level three charger and a level two charger, which is open. And energy comes directly from the building and is accessible, free of charge, to anyone who wants to park in that area.

So, that's from our development, so it's the Planning Department perspective.

And then, we have our Public Works Department, which maintains our Public Works buildings, libraries, police station, city hall, and then the city fleet.

We have a policy, a default policy, to purchase EVs whenever it's feasible. We have about three or four electric vehicles, currently. Most of our fleet was upgraded, like three or four years ago, with CNG vehicles. So, we are not due for any major EV purchase, anytime soon. When that cycle turns around, we plan to buy EVs.

And then, as we refurbish our buildings, throughout the City, whether it's new libraries, or refurbishing libraries, any of our capital improvement

projects, we do put EVSEs along those.

So, those are the two other departments highly involved with this, and we work with them to facilitate it, and then utilities.

So, this is -- so, we, as a utility, do not own or operate any electric (inaudible) chargers in Palo Alto. Our Public Works Department does. We facilitate through them. We have provided grants to them. And they do not, necessarily -- so, this is a chart that shows we have about 22 chargers, currently, in public garages. That's expected to go up another 10 in the next six months. I was just talking to the Facilities Manager. Again, through a grant.

Most of these chargers can break even, from an operating cost perspective, but the capital cost is way high. It doesn't -- it's not justified without grant funding. And we appreciate such grant fundings.

It's highly used, our EV chargers. About four charging sessions per day, per charger. And this shows the different -- the cost incurred by our Public Works Department in the high utility bill. So, utility doesn't pay the bills for the EV chargers. Our public -- whoever is the Public Works Department pays for them. And so, that's how we operate in Palo Alto.

In terms of utility programs, we have a pilot

time-of-use rate for residential. We're also trying to come up with rate designs, which conform to Prop. 26, which is cost-based, but also doesn't -- facilitates EV adoption, or higher building electric vehicle -- electric consumption, whether it's electric vehicles, or heat pump water heaters, or heat pump space heating.

So, we have a two-tiered rate. We used to have three tiers, but now we have a two-tiered rate, with a minimum bill amount. So, that helps with lowering the higher tier.

And then, we also -- additional ways of retail rate impact, we're trying to increase the baseline use if a home puts in a heat pump water heater. And so, 300 units per month, perhaps 400, because it does -- it does have a greater load factor, and that's what I think we talked about, without necessarily increasing the peak.

So, we are looking at load analysis for all three of those appliances, electric vehicles, heat pump water heaters, and heat pump space heating.

LCFS funds a big source of our funding, and we're really -- what Jonathan was saying, it's a major source. That is what we rely on to fund these projects.

And also, we're going to try to use that -- currently, our cost base to discount, for off peak, is about two pennies. That's all we can justify, based on

cost-based approach.

Our transformers are -- since we are a mild climate, the transformers cool off at night, so we don't anticipate any major issue, currently, but we do down the road.

So, considering all of that, the off peak rate was only two pennies lower than the average. And we're going to try to artificially use the Low Carbon Fuel Standard money to provide additional five pennies of discount.

We, again, are going to use the same pot of money. We do charge for connection fee. If a EVSE installation triggers a connection fee from utility, there's a charge involved. So, we're trying to lower that connection fee with a rebate of $3,000.

Our community, we have engaged community. So, when we had this pot of money, which is about $300 to $400 thousand dollars per year, we got about a half a dozen, or a dozen of them and said, hey, the IOUs plan to do this. Bill had ideas from SMUD. What do you folks want to do?

And they decided, as the community stakeholders, they didn't want to provide a discount for EV electric vehicles, or electric vehicle charging at homes. This is the residential stakeholders, who decided that.

So, based on that, we came up with this program, that you see here. So, lowering connection fee, and also things, we are looking at a whole home approach for all three appliances. Sometimes a 200 amp connection may not be sufficient to electrify your gas and water heating -- space and water heating, as well. So, trying to look at fixed connection fee up to 400 amps.

We plan to give a rebate, a $3,000 rebate for nonresidential EV charging. And we do not provide, for residential homes, any EVSE rebate. But if there's Smart charger, and the resident is willing to provide access to the AV charging pattern, we plan to provide a $300 rebate for that.

We are also part of -- we facilitate bulk buy, so that the community, together, can buy in bulk, EVs and PVs.

And thanks to Nissan, we have a bulk buy program, now, which with the rebates we can get a LEAF for about $15,000. Almost like a four or eight thousand dollar rebate over and above the retail price, is what I was told. So, that's another way we are trying to -- so, we are part of the Bay Area Sanchez (phonetic) Program to buy in bulk, to encourage electrification.

In terms of how do we incorporate this into the IRP, we don't have any independent forecast. We rely on

the State's forecast, so that's something we rely on.

So, we found a 1.5 million vehicles by 2025 forecast. We extended that to 3 million, in expected case, by 2030, and 10 million by -- the high case of 10 million.

If you assume those, this is what it means for Palo Alto. Currently, we have 1,600 vehicles. So, that's about 3 percent penetration. We have about 30,000 residents, 45,000 cars, residential vehicles. And so, it's a 3 percent penetration, currently.

But in the long run, so it's we -- since we are early adopters, the long run, the growth may not be as fast. It may not be three times the -- the rate of growth may not be as fast as the State.

This is just an example, just for sharing purposes. I won't get into the assumptions. That's for later. But this is to illustrate that we think, in expected case, about 4 percent of all electric load will come from EVs by 2030. So, that's what we incorporated into our IRP load forecast.

This is a load research, it is not quite scientific, about a dozen or so electric vehicles. We have a 300-home Smart meter pilot, based on those. We estimate about five, in Palo Alto. We heard 8 kilowatt hours, per day, per car, in Palo Alto. For these

customers. Not scientific, not scientifically rigorous. But we, so far, estimate we are using 5 to 8 kWh per day, per car, as the loading.

In terms of IRP, our IRP, we call it LEAP, Long-Term Electrification Plan. We've had one, an IRP, since 1992. So, that's kind of part of our overall approach. And so, this illustrates how -- what are the things we do.

Again, in 2012, I think we adopted the 33-percent goal. And in -- no, in 2009, we adopted the 33-percent goal by 2015. And we are, currently, at 50 percent.

And to the left you see the State, different State initiatives. So, this is our LEAP, Long-Term Electrification Plan strategy. I just highlight the resource acquisition and load forecasting part of the IRP, which is what today's discussion's about.

So, our load forecasting approach, we use a econometric model. Long-term trends are from the model, itself. But then, we add exogenous variables, when there is a rapid adoption, or something, which has not been captured with econometric model.

So, we currently have about 1 percent of local solar. We are hoping, by 2023, we'll be at 4 percent. Accelerated energy efficiency, impact of EVs, all of

these are exogenously modeled into our forecast.

So, this is an illustration of what -- the blue is our actual forecast of energy loads. And the green line show what it would have been without local solar, without energy efficiency, and without electric vehicles. So, that's an internal exercise for us to -- and then, we pass these on to our distribution system folks. This is generated by our supply folks, and then our distribution folks take that and divide that into our distribution feeder assessment.

We have 32 distribution feeders in Palo Alto. About more than half of them are residential feeders. So, electric vehicle impact is mainly on our residential feeders is what we think. The distribution transformers, we assess the impact of the distribution transformers, how the EVs are going to impact.

As I said, as we have a mild climate, where temperatures drop to 60 degrees, even in the summer, at night, transformers tend to cool off. So, we are not overly concerned at this time. But we have -- out of the 1,600 vehicles, about 1,400 of those -- sorry, 400 of those are Teslas, and those can juice up quite a bit.

So, if we see three Teslas in one distribution transformer, we get worried, and we monitor them.

But the way we get that information, that's

another point. We get that information through -- so, either, a Buildings Department permit is pulled for the EV charger, we get to know through our Buildings Department. Or, if that triggers an electric utility upgrade, then we get to know. So, we have two sources of getting that.

The third source we have is through -- which is not site-specific, but as a whole what -- how many EVs are in town. That's through the CARB process, or through the rebate application statistics, which is shown for the State.

So, this is how we use the load forecast for planning purposes, it's what we've been doing for the last, I don't know, many years.

So, on the distribution system planning, transformer loading, feeder loading, impact of ZNEs, zero net energy new developments, what is that going to do to our electric load?

So, that will have a beneficial impact of lowering the load, which is what we want. And then, if we have heat pump, water heating, then space heating, this would increase, so what is the impact of the net.

And we're also doing a number of pilots. Because we are in the heart of Silicon Valley, we have emerging technology program, where different emerging

technologies are tested at our sites. That includes a par factor correction through inverter controls.

Okay, so these are some of the questions, if I haven't answered already, posed by the letter from Commissioner Scott.

So, we highly value Low Carbon Fuel Standards. In fact, that's primarily the source of funds for our electric vehicle related effort. We fund, with public benefits, our electrification of natural gas appliances. We haven't tapped those funds for electric vehicles, yet.

Our relationship with the EVSE vendors are adequate, good. We use grant funding. Without grant funding, it's on an ongoing basis, cost and benefits pan out, but the capital investment is not quite justified, from a ratepayer perspective, without grant funding.

And in terms of 50 percent RPS, we're already there.

The last bullet on this slide, what I refer to, is we are hoping that part of the energy efficiency, the way we meet energy efficiency is through conversion of natural gas appliances to electric. It saves on primary fuel, clearly. And given that we are 100 percent carbon neutral, and every piece of incremental kWh comes from 100 percent renewable, that's a major focus for us.

CEC can most certainly help us, and smaller utilities, like us, in terms of registration information. So, DMV has registration information. We would like to get that through some channel. Apparently, it's very burdensome to get it on individual basis. But if CEC can somehow get it at a zip code level, ideally POU service territory level, and provide that, just number -- not only the number of EVs, but also the characteristics of those EVs.

And also, with long-term forecast. We have no idea what the market is going to look like. It depends on what the vehicle manufacturers come up with and the public adoption rate. We can -- we think our adoption rate is about twice -- it used to be four times the State rate, about two years ago, of EV adoption rate. But it has now dropped to about two, I think. So, we can extrapolate or interpolate what it means to Palo Alto, based on a State number, but we cannot come up with those numbers on our own. For that matter, other communities.

Yeah, so these are some of the assumptions we made, as we come up with these projections. The 4 percent load, from EVs, by 2030 projections, were based on some of these high level assumptions. And we like to be engaged through our partnering agencies, like NCPA.

We don't have the resources to devote to each one of these, so we act through our partnering agency, of NCPA, and Jonathan will speak to that.

MR. CHANGUS: Great. Thanks, Shiva. That's a good segue. And I did recognize that I was what stands between us and lunch, so I have one slide.

(Laughter)

MR. CHANGUS: The key point, I think starting off, the questions that were provided to the utilities were fantastic questions. Unfortunately, for most of us, they're questions that we're still trying to get together on how we want to answer. And so, it's an excellent opportunity. Very much appreciate this workshop to try and figure out how we can learn from each other, and how we can collaborate with the CEC, going forward, on figuring out some of those key points in support of the State's objectives.

And to that end, one of the main functions NCPA does, is to bring together some joint action. And we have convened, recently, an EV working group. SCCPA's had, I believe it's just electrification, not just folks on transportation, but electrification in general, a working group that's been around a little bit.

And we exist to help support our members, kind of serving as a forum for best practices, for sharing

program design, very similar to what you're hearing, today. And focusing on rates, and rebates, and procurement, and permitting, kind of four different areas regarding and related to EV charging. And different programs that have been successful, areas where we've learned maybe that was not the best set up, and how can we use that going forward?

You've heard a lot about Low Carbon Fuel Standard, so I won't belabor the point. But both that, and the Alternative Fuels Grant funding that the CEC provides, is quintessential.

The utilities in the room, what they've shared about their investments today, have been significantly supported by either State and/or Federal funding. And some of that is through the Credit Program, as well.

And so, understanding the longevity of some of those programs, and to continue to foster that kind of investment would be key.

I will note that a lot of those programs, understandably, are focused on economies of scale. So, larger utilities, larger projects stand to benefit a great deal more than smaller utilities, with smaller projects, because it's more administrative costs and hassle for the granting entity. It's also more of a workload for the smaller utilities.

So, trying to figure out how we can simplify those processes for some of the smaller and midsized utilities, and that's -- SCPPA's successfully participated on behalf of their members. And that's an area that I think NCPA would like to get involved in, as well.

But understanding that significant changes to these programs, as well as, you know, Kevin mentioned the zero net energy building. That's a fantastic question and something we don't want to be a hindrance to our GHG reductions in the transportation sector.

But there are a number of those areas where, especially distributed energy policies, could be complementary if we design them right, and think them through. But they can also be conflicting. And that's a great example, so trying to think through what that looks like.

And then, we've heard, a couple of the utilities talked about similarities to energy efficiency programs, and what we've learned there. And that's a fantastic, we've got a lot of experience administering EV programs, working with third-party partners to support both utility-run programs, and the third-party programs.

And I think one of the key points I want to take away here is that one size doesn't fit all. What we've

seen be successful in one utility is not necessarily going to port over, even though they look and feel like they have a similar makeup. Understanding the customer base, and who's actually charging, is quintessential. And that's a lot of the market research that we don't have our hands on today, that we are looking to secure and would look to folks in the room, as well, outside of the utility industry, to help provide some of that support.

And there are fantastic resources. The PEV Collaborative was mentioned, earlier, California ETC, are other resources where we're looking to partner, kind of going forward, to try and figure out, from a resource planning perspective and from a program design perspective, what we should be preparing for and what our customers may be interested in.

And my last point, which I didn't put on the slide, because I might get in trouble for it, speaks to the difference between resource planning and aspirational goal setting. And that NCPA members, historically, have adopted a more conservative approach to resource planning based on available market data. You know, what the modeling indicates versus the more aspirational goal setting, which is we'd really like to be here, but we're right here.

And for our approach, it's not to say you shouldn't have the aspirational goals, it's just recognizing we do resource planning to help us identify what that gap might be, and then we look forward to designing the programs, and working together to lift that forecast up.

But we don't want to artificially adopt higher forecasts that don't really reflect what's going on in our customer communities, and in our individual utilities.

So, with that, I'll just say thank you.

COMMISSIONER SCOTT: Thank you, very much, both to Shiva and to Jonathan for, yet, another excellent presentation.

I see Kevin's mic lit up, so go ahead and ask questions.

MR. BARKER: So, this is somewhat philosophical in nature, but then, also, trying to tie back to kind of what we're doing here, at the Energy Commission.

And I guess, first, quickly, I'll just go, Jonathan, to your point. Hence, the aspirational histories on -- interested in sort of just what that 2020 time frame is. So, something somewhat more realistic.

The same for Palo Alto, and maybe for all public

power, is it a doubling? What is it, sort of at that 2020? And you don't have to answer that.

But getting to the -- what's kind of our bread and butter here, at the Energy Commission, and I know what we're really trying to add to our forecast is what our EV load's looking like. And then, also what is the distributed energy doing to the sort of peak. And that's what we've been doing in this update is looking at this peak shift phenomenon.

And one of the things that, you know, I kind of saw here, and I'm seeing a theme, is maybe this off peak is still sort of living in kind of an old mentality of what off peak is.

And I noticed that off peak, for Palo Alto, and this isn't to try and call you out, but is that, maybe, 90 to 95 percent of what your actual peak is, of when it starts.

And so, maybe just trying to think through, as we are going to get to sort of what is the rate structure for EV charging, how does that -- the shifting of the actual loads kind of change how we think about charging of the electric vehicles?

And I guess, the one more point, and maybe I heard it wrong, but I think I'd heard that there was an installation of a level three charger, and I didn't see

that in the presentation, but on one of the public buildings. And again, this just gets to thinking through what's the plan for integration and having, maybe rates help with the integration of renewables for -- you know, I applaud you for having such high levels of renewables. But with that, comes a lot of intermittency in the supply.

So, just thinking through what is the game plan, if you do have that level three, right now it's free, which doesn't incentivize any sort of, you know, Smart charging. But if there is a game plan for thinking about the Smart charging, as you deploy a lot more of those kind of fast chargers that do add impacts to the load.

So, with that, that's it.

MR. CHANGUS: Yeah, just a quick response and then I'll let Shiva jump in, if he's interested.

I think you raise a really good point, Kevin, about the difference in what off peak means to different utilities. And we are all familiar with the duck curve, but the duck curve doesn't necessarily reflect what's going in a lot of NCPA member utilities, based on their customer demand, as well as their resource investment.

And so, figuring out, and I think the Integrated Resource Plan is a good, solid planning effort,

something that a number of folks were already looking at doing before the legislation, to better understand all those changing dynamics. And what does off peak and what does peak look like, as there's higher solar penetration, as there more EVs, as we continue to drive towards the most aggressive efficiency standards across the nation.

Those are going to have real world impacts and the IRP's going to help us figure it out.

What the math adds up to, for individual utilities, is not going to be the same, but we should be looking at all the same factors. And that's what I think the IRP provides is, you know, even though the results are going to be different, we should be at least talking and trying to look at things through the same lens.

MR. SWAMINATHAN: Just one addition to that. So, there is peak and off peak supply, and there's peak and off peak distribution transformer loading. Those two are completely different items. And for each one, it's unique, and that's what we're trying to grapple with.

COMMISSIONER SCOTT: I had a question for you. So, you mentioned that the City of Palo Alto is not actually -- the utility there is not owning and

operating the electric vehicle support equipment, but that is the Public Works.

And I wondered, that's the first time I heard that from you. And so, I'm wondering, across the 16 -- and I don't know that you have this answer, but maybe Jonathan does. Across the 16 POUs that fall under the definition that we're looking at, do you know how many have, maybe, like a Public Works, or some other entity, other than the utility, who's actually running and operating the charging infrastructure, or is that unique to Palo Alto?

MR. CHANGUS: I don't have the exact numbers and we can follow up. I will say that it's one of the more active conversations about to own or not to own, and is it the utility or some other function of the City.

And so, I would say that, for the most part, a lot of the NCPA members aren't quite as far along, as Palo Alto, on formal EV plans, themselves.

There are a number of cities that do have some manner of public charging that they've invested in, usually through some grant, previously. But that's -- I would view those more of pilot projects. That's not going to be indicative of the plan going forward. Those are kind of one-off chargers, kind of legacy chargers. Going forward, it's a question that I think they're

trying to answer, that they may not have answered, yet.

COMMISSIONER SCOTT: Okay. Let's go to John and then Jim.

MR. TILLMAN: Thanks for the presentation. My question is, essentially in kind of two parts, and this not just applied toward your presentation, but all the POUs in the room. What is the ratio of your residential ratepayers, who live in single-family homes versus MUDs?

And the reason I ask that question is because future growth of ZEVs in the marketplace is going to require a pretty significant penetration in those who live in MUDs. And unless we increase the amount of chargers available to those in MUDs, we're going to be seeing a shift toward using workplace charging, which will shift your usage of electricity toward the day, away from night.

How do you see -- answer the first question, I guess, about the ratio, and then going forward how do you think that shift toward MUDs is going to affect your plans farther out?

MR. SWAMINATHAN: I can just answer for Palo Alto. So, 60 percent is the number for single-family, as a percentage, and 40 percent is multi-family homes in Palo Alto, 60/40.

We pretty much expect to spend 80 percent of our

LCFS incentives to encourage EV charging, EVSE installation at those multi-family, mixed use type of buildings. So, that's the Palo Alto answer.

COMMISSIONER SCOTT: Let me see if Bill, or Marvin, or Kapil wants to answer that for their utility?

MR. MOON: Marvin Moon. In L.A., 51 percent of the people live in multi-family dwellings. And we see a multi -- it's going to take several solutions for getting charging in those infrastructures.

That's why our rebate programs, on the residential rebates, work for multi-family, as well as the commercial one.

Additionally, we see DC fast charging as a partial solution of workplace charging, as well.

MR. BOYCE: Bill Boyce. We're about 60/40, also. I think we're actually a little bit, even more like 63/37, or something like that. But we really, as Marvin said, we do have incentives for multi-family.

But we also have some concepts where, you know, looking out in the future when fast charging is even faster, seeing more of gas station type models helping to kind of bridge the gap for multi-family dwelling.

Because of getting, you know, level two chargers in a lot of those existing facilities is just not going to be very cost effective. And looking at more

community-central charging, we see as kind of a good solution set for that in the future.

COMMISSIONER SCOTT: Any thoughts on that, Kapil, and then I'll go back to John.

MR. KULKARNI: In Burbank, it's about 40 percent single-family and 60 percent multi-family, and I think that will increase in the future because our single-family zones are built out. So, it's just going to be more multi-family housing in the City.

And so, we've tried to address that through curbside charging, as well as having a higher rebate for multi-family residents and buildings.

MR. TILLMAN: Bill, thank you for your point on -- we're seeing more and more of a need for the faster chargers. And we absolutely recognize, Nissan recognizes, that the cost of installation of the DC Fast Chargers is just too significant to be considered at most, if any, MUDs, as reasonable.

So, again, the model -- going toward the model of a gas station model, where you go to one location, charge very fast, very fast in the future, is probably the only way we see it moving forward significantly.

COMMISSIONER SCOTT: Jim, and then Kapil.

MR. HAWLEY: Thank you, Commissioner. This is a question for Shiva, or a couple questions, really

related to the use of the Low Carbon Fuel Standard Credits.

It looks like you are using them for a lot of things, lower nighttime rates, rebates, you know, that sort of thing.

I guess I'm wondering how DPW is maintaining its stations? Are you using LCFS for that, as well, or how are you doing the maintenance and the costs?

MR. SWAMINATHAN: We don't have any charging stations which we own. The City owns, the Public Works. So, Public Works is paying for it. Typically, we have business districts, with the parking garages. So, the parking garages are managed by the City, on behalf of the business districts.

So, business districts are paying for it, indirectly.

MR. HAWLEY: Okay. And then, the other question I had is just it looks like you're intending to claim the credits, or that you're using them, also, for lower interconnection fees; is that right?

MR. SWAMINATHAN: Correct.

MR. HAWLEY: So, are you intending to claim credits for independently owned and operated stations in Palo Alto?

MR. SWAMINATHAN: We are open to it. There have

been some requests, not serious ones.

We have an entity called Acterra, which is a not-for-profit organization in the Bay Area, kind of which we partner with for EVs, energy efficiency, whatever, within the home kind of approach. So, we're trying to see whether we can enable them to claim.

I heard, IOUs had been authorized to do that. It's rather -- it's a small -- I mean, there have been residents, this resident who has a public charger, at his home, wanted us to claim.

I mean, it's a less expensive to do that, about one or two credits, per year, per charger. But we don't have any immediate plans, but if there's such a demand, we may enable a third party to do that on our behalf.

COMMISSIONER SCOTT: Great. We'll do the last question from Kapil.

MR. KULKARNI: Hi. Thanks, guys, it's good to hear from another small, to medium-sized POU. And so, I saw some similarities with Burbank, in terms of, you know, we have a few more public chargers, so I'll take credit for that.

But the number of EV registrations was three times what we have in Burbank. So, I wonder if that speaks to the State, and dealers, manufacturers, because of, say, Palo Alto's higher income per household. That,

you know, the State, or manufacturers, and dealers, need to provide higher incentives for low, and middle income households, as opposed to setting income caps? Or, what do you think about how we can encourage more adoption throughout the State?

MR. SWAMINATHAN: It's a public policy question, so I would -- I have no opinion on that.

MR. KULKARNI: Well, I guess, more to see if you think that income is one of the things that is driving EV adoption in Palo Alto?

MR. SWAMINATHAN: Yes. Coolness, Tesla. I mean, we have 400 Teslas in town, so about 25 percent of them. And we're early adopters, so even the plug-in gasoline engine, when it came on, there was probably a higher turnover of vehicles, too, so we don't drive as many older cars.

So, affluence is part of it, technology, and then turning. So, early adopters, there were many early adopters, whatever the reasons may be.

COMMISSIONER SCOTT: All right. Well, please join me -- oh, I'm sorry, Bill, go ahead.

MR. BOYCE: I was just going to make a comment, Kapil. This is one of the reasons why we started looking, not at just our percentage of State population, but actually, what's the percentage of new car sales in

our service territory. And it tends to reflect, maybe, some of those socioeconomic, demographic type stuff. So, it's not necessarily, okay, am I behind or ahead but, you k now, that's got to be relative just to the sheer number of new cars sold in your area.

COMMISSIONER SCOTT: Excellent. Well, I think this has been fantastic morning. Please, join me in thanking Tim Olson, for his great presentation, this morning, Amy Mesrobian, Marvin Moon, Bill Boyce, Kapil Kulkarni, Shiva Swaminathan, and Jonathan Changus.

And also, thank you for our Panelists, for an engaged discussion. I look forward to the same this afternoon. So, thanks, very much, everyone.

And we will reconvene at 1:00. See you then.

(Off the record at 12:01 p.m.)

(On the record at 1:05 p.m.)

COMMISSIONER SCOTT: Welcome back to our afternoon session. We are really looking forward to hearing from the speakers that we have planned for this afternoon.

We've got about 25 minutes per presentation, so we're hoping to divide that up, kind of about 15, 20 minutes for a presentation, and then another 5, 10 minutes there for questions, and the discussion around the table, for each person.

So, I am going to turn this back over to Tim Olson, to get us going for the afternoon.

MR. OLSON: Okay. Our next speaker is Nancy Ryan. She's a Principal with E3, in San Francisco. And she's going to talk about a number of things, including some tariff rate design, and a number of other factors.

MS. RYAN: Thanks for the intro, Tim. And, Commissioner Scott, Kevin, thank you very much for inviting me to come and speak to, and I hope, with you all today.

So, the presentation I will be giving is kind of gleaned from a number of studies that E3 has done over the last few years, both with the utilities and with the Energy Principles.

So, what I'm going to try to do from this is really pull out the themes that I think are most important for integrated resource planning. And that's for in the IOU, as well as the POU context. I think these are quite broad themes.

So, I think, E3 is familiar to most of you. If it's not, you can look at this later.

So, I want to start by orienting the electrical transportation in the context of the overall greenhouse gas policy, mitigations policies of the State. So, I expect many, if not most of you, have seen me, or

someone else from E3, talk about the Pathways Study that we completed for the Energy Principles, in 2014. This study was commissioned in order to help inform the Governor in setting the 2030 target.

What we did in that project was to explore a range of technology deployment scenarios that would reach, ultimately reach the 2050 target of 80 percent below the 1990 level. And they asked the question, how far can we get in 2030? What does it take to get there? And what does it cost?

And we did scenarios that focused on timing, which are depicted here, as well as scenarios that were more focused on what are some different, you know, alternative technology pathways.

So, I'm putting this up because it's really a preview of coming attractions. So, our most aggressive scenario, in this Pathway Study, reached 38 percent below the 1990 level, in 2030. That's our early deployment or accelerated deployment scenario.

Well, I think we all know the Governor rounded up, and he set the target for 2030 at 40 percent. And E3 is currently working for the Air Resources Board to develop new scenarios that are consistent with the goal as set, as well as with ongoing modeling and analysis that's being done at CARB. And those results should be

released, along with the draft scoping plan, I believe in a few months.

So, meanwhile, what we have to look at, to get a sense of what it will take to hit the 2030 target, is the early deployment scenario from the earlier work.

So, a common theme in all of the scenarios, whether they're delayed or early deployment, and whatever technologies they deploy, is that they all require, really, significant progress on all four of what we call the "pillars".

So, energy efficiency and conservation, fuel switching, whether to electricity or hydrogen, in both vehicles and buildings, decarbonizing electricity, and decarbonizing liquid and gaseous fuels.

So, we need to make enormous progress, by 2030, on all of those fronts, going much beyond what we've done before. And I think, also importantly, and I'll come back and stress this, beyond the laws that are already on the books.

So, I know a lot of people took a deep breath when the Legislature passed the 50 percent RPS statute, and a lot of people are still kind of struggling to figure out how we're going to accomplish meeting the ZEV Mandate. But those are really, now, the down payment on what has to be accomplished by 2030, based upon this

Pathways analysis.

The other thing I want to point out is that another key finding, from the Pathways analysis, is that in order to cost effectively meet the 2030 goal, it's critical to achieve high levels of integration between the different sectors of the economy and across these pillars.

And in particular, what I'll focus on today, and I'm not the first person to bring this up today, is the relationship between pillars 2 and 3, so fuel switching, specifically electrification and decarbonizing electricity.

So, turning, now, specifically to the context of IRP. I know one theme that has arisen, and I've seen this -- understand, I've heard this as a concern in the POU world, and I've certainly seen it and heard in the work that we're doing with the Commission, the Public Utilities Commission, to support their IRP efforts for the Investor Owned Utilities, is there's uncertainty about kind of when, and how much, EV load will show up on their systems, and how much generation, and specifically renewable generation, utilities will need to serve it.

And I think one of my big messages today is that this is important. We have to think about it. It's,

obviously, a critical part of integrated resource planning. But, it's really not so much the size of this load, at least for the next 15 years or so, 10 to 15 years. It's really not so much the size of this load, but the character of this load.

And here's a result from the Pathways Study, and this is actually the -- I think it's the -- it's not this early deployment case, it's either -- I think it's our straight line case. That shows how the total consumption of electricity in California would evolve, over time, to meet the 2050 goal, and a very aggressive 2030 target. Not as aggressive as the one the Governor set.

And I think there's two really key things to take away from this. The first is that, really, the big growth in load, in electric consumption, occurs after 2030, it kinks in 2030. And by far -- and transportation is -- so, that's charging of EV. Transportation is never a big part of that load. It grows a lot, it grows from practically zero today. But it's not the big source of load growth. It's more hydrogen production, for however many fuel-cell vehicles are on the fleet, compressing of natural gas, power to gas, and so on, and so forth.

And then, also, increases, you can see like

increases in the commercial sector, so that's commercial and residential sector. That's primarily electrification in buildings that are, simultaneously, becoming far more efficient, as they're becoming more electric.

So, clearly, we need to develop methodologies to forecast this load, understand the variability around our forecasts, but much more important is the character of the load.

Now, why is this important? Skip that. Because going back to the aggressive, or the early deployment scenario that I described before, for meeting the 40 percent target, or it's closest to what it takes to meet the 40 percent target. That scenario has, not 50 percent grid scale renewables, but 60 percent grid scale renewables, plus tens of thousands of megawatts of rooftop solar. So, far more than we have today.

So, again, as I pointed out before, the laws on the books are not going to be enough to get us there.

Incidentally, it also has something on the order of 8 to 9 million zero emission vehicles in the fleet, by 2030. So, again, much more aggressive adoption than is envisioned, even, by the ZEV Mandate. And, you know, significant upper inflection beyond kind of blowing past that goal in 2025.

And this new load is going to -- I mean, the new generation that we're going to be adding to decarbonize the electric sector to meet this 40 percent target, is going to be heavily solar. Now, how much solar is in it depends on, for example, the fate of the efforts to regionalize the ISO. A movement towards a Western RTO, with much more exchange within regions would enable us to have a more diverse portfolio of renewable resources, particularly more wind.

We'll see which way the wind blows, over the next year or two, with regard to getting legislation to enable that.

But, particularly, if we stick with the more, kind of the approach we have today, then we're looking at a resource that in-State is predominantly solar, for grid scale stuff.

And even if we're -- you know, even if we are able to procure from out of state, that reduces the share of solar, but it's still a very heavily solar mix.

It also has a big share of distributed generation. Again, I mentioned, tens of thousands of megawatts of distributed solar. How much of that we get depends very much on what happens in the next round of consideration of the Net Energy Metering Policy, at the Public Utilities Commission.

And here are two forecasts for how much distributed solar we would have in California. Going out to the late 2020s, the blue one is based upon, essentially, a continuation of the policies that we have in place today. The red one reflects -- that's the CEC's IEPR forecast, and would be more realistic, under less favorable rate-making treatment for net energy metering -- or, for rooftop solar.

So, if you add that all up, we're looking at a generation mix, by 2030, where we have approaching 40,000 megawatts of solar, approximately equally split between utility scale and behind the meter.

The utility scale versus behind-the-meter split is important because, of course, the ISO really doesn't have visibility into what's going on behind the meter, or as much ability to control it.

So, we all have heard about the duck curve, and the fact that the duck curve requires us to have a more flexible resource mix.

One thing that's symptomatic of this situation is what we're already starting to observe in day-ahead energy markets. So, this shows a progression, starting from 2011, on the left, through year-to-date this year, of prices being -- or, on the top, the amount of solar appearing in day-ahead markets, and then the average

prices that are being observed in those markets.

And what you see is, as the solar goes up, there's kind of a steady downward progression in the day-ahead prices.

So, that's both a problem, in that it's indicative of solar over-generation, so that's a problem for the system operator. It's, of course, also an opportunity for plug-in electric vehicles. I'll say more about that.

So, while we haven't, yet, gotten to the point that we're seeing zero prices in day-ahead markets, we are often seeing zero prices in real-time markets. So, this is, you know, this opportunity is already present today, essentially. The need is here, today.

Now, one thing that's important to take in mind, in the integrated planning context, is that Smart charging of electric vehicles, whether that's via time-dependent rates, or by managed charging, and both have been demonstrated in California to date.

However we do it, that's one, among a number, of solutions. And our work, particularly for the utilities and for the ISO, understanding the management challenges around reaching the 50 percent renewable target, has really pointed to, I think, one important conclusion. Which is, there is no pure play here. It's really a mix

of solutions to maintain, balance both in the bulk power system, and at the distribution level. the distribution level, of course, is increasingly important, as we get more and more distributed solar on the grid.

So, a key to ask in integrated resource planning is to, you know, rationalize and price the different kinds of resources that can be deployed to balance out load. And, in principle, managed charging, or Smart charging electric vehicles is a low-cost resource, because the battery's already, from a utility's perspective, the battery's already bought and paid for by the driver.

What we don't really understand, yet, and what it's crucial for us to understand better, to work into subsequent iterations of integrated resource planning is, from a technology stand point, what's built into the car, the kind of charging network we build, and from a consumer behavior, and incentivization -- an incentive stand point, what does it take to actually activate the flexibility in -- the latent flexibility in the vehicle fleet and the electrified vehicle fleet.

And that's a critical question that needs to be addressed in whatever programs, you know, IOUs and POUs, alike, to ask out in the field over the next few years.

That's going to take well thought out demonstrations, or pilots, with rigorous experimental design, that really yields meaningful answers that can flow back in to the kinds of assumptions that get put into your integrated resource plans, and help illuminate the relative value of Smart charging, relative to other flexibility solutions.

I'm going to pass over that. And I think I'll just close by kind of reiterating my main point, is that, you know, yes, the amount of EV load matters. But over the next 10 to 15 years, while we're kind of perfecting, developing and perfecting forecasting approaches for that load, it's not really so much the amount of load, as the character of that load that matters.

This is the time in which we can both understand better and shape the character of this load. And I think that should be a critical aspect of your electrification programs, and there needs to be a conscious linkage with the IRP programs. So, I will close with that.

COMMISSIONER SCOTT: Terrific. Thank you, very much, Nancy.

Let me turn to our folks around the table, and see if they have thoughts or questions to share with

Nancy?

Jonathan, go ahead.

MR. CHANGUS: Great. It looked like on the slide 13, you're talking about the negative pricing. In addition to like MP 15 and SB 15, are we seeing like are there certain areas, like LCAs, where this is happening more frequently, or more often, or that's forecasted to, so that there may be, actually, areas that make that revenue or that economic business case sooner, rather than later?

MS. RYAN: Right. I mean, I don't have an answer for you, today. But I think that's an example of the kind of thing that the PUC, through its Distribution Resource Planning Program, has been trying to shed some light on.

And, I don't know, Bill or Marvin may know something about what's going on in their service territories. They've got their cards up, so they can answer that question, or not, when it comes to them.

COMMISSIONER SCOTT: I'll turn to Bill, who was next. If you have an answer, please feel free to weigh in.

MR. BOYCE: I'll let Marvin in on that one.

(Laughter)

MR. BOYCE: I was going to go back to your

scenario, though. How much energy storage did you model in? Is that a variable or is it just like a fixed amount?

MS. RYAN: Right. Okay, so let me go to the slide I skipped over because how much energy -- so, you mean stationary; right? So, how much stationary energy storage would be required on the system depends on a lot of other things. I mean, if you think about, sort of in a very crude sense, what a supply curve for flexibility solutions would be, stationary storage is really at the top of that supply curve. Today, it's really the most expensive solution.

The low cost things are improved regional integration, a more diverse resource mix, and those two are mixed up, together.

You know, again, advanced demand response, and flexible charging of -- Smart charging of EVs, really, are probably the next thing in that stack.

So, we asked the question, sort of where do we start with -- where do we start with the resource mix, and the regional coordination, then how much can we get out of buildings and EVs. And then, our modeling approach, at least, and I think it's conceptually correct, our modeling approach then says, sort of, how much additional storage do we need on top of that?

So, I pulled this up because these are the two different technology scenarios that we look at, which I think are helpful for bracketing.

So, we have the same assumptions, which I can't say what they are, but they had the same assumptions for like the degree of regional integration, and the mix, and the renewable portfolio.

But what they contrast is, if we have a fleet, in the top case, that's kind of equally -- has a kind of equal amount of fuel cell vehicles, and battery electric vehicles, what are the flexibility needs on the grid, in that case, versus the bottom case, which is our case where there's basically no fuel cell vehicles, or there's so few they don't count.

And the key point here is that if we have a grid that's a hundred percent -- if our EV fleet is a hundred percent battery electric vehicles, even though we can get a lot of flexibility out of the vehicles, and we're assuming we're getting some flexibility out of buildings, there's not enough -- there's not enough flexibility in the vehicle fleet, even under what we think are pretty optimistic assumptions.

And so, you need a lot of energy storage, long-duration energy storage. So, really, more like what you get with pumped hydro, or PLO (phonetic) batteries.

In the case on the top, where the fleet's kind of split between fuel cell and battery electric vehicles, we have to get all that renewable hydrogen from somewhere. And what we see there is that we get lots of flexibility out of the EV charging fleet. Again, we kind of milk it for all we think we can get.

And then, the rest of it comes from managing -- basically, treating the renewable hydrogen production process, the electrolysis process, as a flexible load.

And in that case, there's no need for energy storage. So, it really depends a lot on the other, kind of both the other strategies that are deployed in the electric sector, and then what happens in the transportation sector, in terms of what technologies come to dominate.

COMMISSIONER SCOTT: Marvin?

MR. MOON: Great presentation, Nancy.

MS. RYAN: Thank you.

MR. MOON: I have a question. You showed how much of everything we need. So, considering we want to encourage solar, and electric vehicles, and so on.

But, do you see a shift in the economic model between here -- like net metering puts a premium on the value of solar. But to the extent that we're creating markets where you have to pay to get rid of it, how do

you do both? Get a lot of what you want, but then not have a sustainable market?

MS. RYAN: Yeah. I mean, that is one of the questions that I think that, you know, we will all be working on answering over the next several years.

But I think the key answer to that question is we do both by integrating how we do each of them, right. And I think a theme that I see, really emerging, in kind of the policy conversation going forward, is that none of these policies or transformations are incremental anymore. You know, like the RPS was incremental when it was 20 percent, because we already had a lot of renewables out there that had come from PURPA, and the increment that we added was small.

Fifty or 60 percent renewables, with all this rooftop solar on top, that's not incremental. That's core. And we're really reshaping the architecture of, you know, both the built economy, the transportation sector, and our energy sector. And we can't do that without going forward with an understanding of what those linkages are.

And really, again, I'm bringing it back to planning. I mean, that really has to be a conscious part of the planning paradigm is how we make those two sectors work together, because that's how we get the

least cost solution, overall solution for customers.

COMMISSIONER SCOTT: I have a question for you, Nancy, about you mentioned that it's the character of the load, right now, that's the most important component. And for those of us who don't do this particular component all day, every day, are there specific attributes that you would recommend we look for? Or, what is it about the character of the load that we should bear in mind?

MS. RYAN: Right. I mean, above all what I mean, when I talk about the character of the load, I really mean the inherent flexibility in the load, or our ability to activate that flexibility.

So, and there are a few questions around that. Some of them things that are exogenous, that, you know, we in the policy community or, you know, utilities can't influence, and others, you know, but that we need to learn about. And then others that I think we can, you know, to some extent, put our hands on.

So, we don't really understand, yet, the tradeoffs that individual drivers are willing to make between, you know, some sacrifice and their optionality around their mobility. I mean, that's really what we're asking them to do in a managed charging, or Smart charging context is, you know, be willing to not like

get their battery full, right away, every time they have an opportunity to do that. And that's, effectively, sacrificing some optionality.

So, we don't really know how much that's worth, although we do know that personal transportation is really valuable to people.

The second thing is that, and here's where there's a real direct influence, by what utilities and regulators, and some other players in this ecosystem do, is like what kind of charging network do we build out? Does that charging network, you know, is it more or less effective in activating the latent flexibility, consistent with what customers, you know, are willing to cede.

And that's something that really has to be front and center, in thinking through proposed investments that utilities and their partners bring forward, in terms of -- and I think, again, testing them. You know, does the availability of large DC fast charging plazas, you know, cannibalize our ability to manage charging, you know, in the workplace, to offset negative or to capitalize negative prices. I mean, we don't know the answers to those questions, yet, and those are things we really have to test.

And so, the last thing I would say is that with

regard to, you know, consumers' behavior, I don't think that that's totally exogenous. I think that it's probably their expectations are, in fact, quite malleable, as they begin to encounter this new technology, or at least to some extent malleable.

And I think, figuring out the extent to which they can be influenced by the tariff designs that they're offered, or the managed charging programs that they are offered, and the technologies that make it easy, relatively easier for them to participate, that's a critical question. Thank you.

COMMISSIONER SCOTT: Great. We'll go to Kapil, and then finish up with Bill, and then Shiva.

Go ahead, Kapil.

MR. KULKARNI: Thanks, Nancy. So, Commissioner Scott mentioned the character of the load and you mentioned the negative pricing. Are there any utilities looking into paying customers, outside of net metering, for usage during that time, or are there any kind of experiments that -- do you foresee a day when customers will be paid to use energy during these negative pricing periods?

MS. RYAN: Yeah, I mean, I can point to two pilots that are underway right now. So, the first one is one that San Diego Gas & Electric is sponsoring. Is

there anyone here from San Diego, from the -- okay.

So, they got approval from the Public Utilities Commission to pilot what they call a vehicle grid integration rate, which has both a locational component, so that takes into account -- you know, addresses the issue Jonathan raised, that there may be some circuits that are more congested, than others. And it has a day-ahead real-time price component.

So, that signals to them, you know, when and where it's the least cost for them to charge, based on these, you know, wholesale market conditions. So, that's one approach. That's a price-based approach. It obviously involves, you know, a lot of enabling technology.

The other one, that is kind of the opposite end of the spectrum, is a pilot program that BMW and PG&E did together, and that focuses on Smart charging. So, BMW recruited about 100 i3 purchasers. They received a $1,000, up front, incentive payment for participating in the program. And then, were paid every time that they allowed their charging to be cycled off during what, effectively, was a direct load control program.

And they cycled them, lots of times, at different periods of the day. But, fundamentally, it was about understanding, again, sort of how much of that

flexibility is there, and what does it take to activate it.

So, I think those -- you know, I understand the Commission, and then you're going to hear from somebody this afternoon, I understand they're going to have a workshop, later this year, to kind of share what's been learned from these and other pilots. So, I think that's really important and we probably need to see more things like that.

Shiva was next?

COMMISSIONER SCOTT: Bill, and then Shiva. We'll take the last question from Shiva.

MR. BOYCE: Yeah, the one comment I have about all the, particularly the managed charging in workplace is, really, the charger, itself, is a more valuable asset for charging, versus somebody sitting there not charging, waiting for a price signal to come through.

And, you know, because right now for, you know, every car that would sit there, not charging, waiting for the magic price signal to come through, to either sync up with the duck curve, in the morning or the afternoon, you're going to most likely, because it's a limited resource, have four or five people that would unplug them --

MS. RYAN: Right.

MR. BOYCE: -- because they're willing to charge at that time.

MS. RYAN: Yeah, that is --

MR. BOYCE: So, those are the scenarios. I mean, we can make a dance. I mean, you can do that. But the fact of the matter, the energy need and desire for the charging, I think is going to overcome, you know, individuals trying to take advantage of, you know, beneficial price signals, and negative pricing, and all that type of stuff.

MS. RYAN: No, I think that's absolutely right. I mean, some of this is -- I mean, so if the -- you know, if the finding is that we really want to have a large fleet of cars plugged in, all the time, during the day, you know, that has very different implications for how much we have to invest in the charging systems. And also, the functionality the charging systems have, or the extent to which there are sophisticated communications and settlement systems built into them.

I think the other point that I want to make is that, fundamentally, you know, integrated resource planning, in a high renewable, heavily electrified world, is really all about -- everything is capital intensive in that world. We're not really -- you know, because it's capital that delivers the fuel. There's

less and less actual fuel.

So, we're not trading off variable cost versus capital costs, like you do now, with like, you know, increased fuel economy, in an internal combustion engine vehicle.

So, if you strip the planning question down to the very bare bones, it's really about which resource is it most cost effective to have under-utilized. Yeah, so, that's probably a good point for me to end on.

MR. BOYCE: Well, or the other one I think about is just the natural load shape of workplace charging, with that early morning duck curve, is a beautiful fit, without having to do much, at all.

MS. RYAN: Right.

MR. BOYCE: So, as much workplace charging as you can bring on, with or without having a managed control system --

MS. RYAN: Right. I mean, the less we have to have the managed system, you know, the cheaper it can be, right?

MR. BOYCE: Right.

MS. RYAN: And that's -- it's all about optimizing the capital. Like, how much do we need to get it, you know, to get that resource? You know, what's the incremental cost of getting a little bit more

flexibility out of the resource? Those are the things that we need to understand in the, you know, sort of the next several rounds of pilots.

COMMISSIONER SCOTT: Great. We'll hear the last question from Shiva, and then we'll go to our next presenter.

MR. SWAMINATHAN: Nancy, the question is, do you see a standard emerging for charging cars where it's modulated? So, we all think, agree, we should try to maximize the value of those storage systems. Is there more to develop a standard where it can modulate, not load control, on/off, versus modulation?

MS. RYAN: Oh, dial it down. You know, I'm the last person to ask about standards. That's outside of my wheelhouse. See Dan, maybe Dan will have something to say about that, later.

But I think it's -- you know, that is something that's potentially valuable and, again, what we have to test.

I guess the last thing I'll say, though, is that, really, based on the work that we've done, you know, most of the value from flexibility in charging is really about shifting it during the day. That's by far -- you know, that's much more valuable than sort of the minute-to-minute stuff that you capture in the ancillary

service markets.

Those are thin markets, and a lot of resources, and increasing number of resources can provide them. So, it's really about the shifting over the day.

Now, modulation is kind of a strategy that, maybe, you know, makes charging, managed charging work for more customers, because they're sacrificing less.

It also requires a lot -- you know, I think it requires way more participants to aggregate up to a meaningful -- a meaningful impact.

COMMISSIONER SCOTT: Thank you, very much, Nancy, for a fascinating presentation.

I wanted to remind folks in the room, if you'd like to make a public comment, we have those blue cards out in front, on the table. Please be sure to pick one up, and you can hand them to Tim, and he'll make sure I get them. That's how I know that you'd like to make a comment.

And, of course, if you're on the WebEx, you can just raise your hand, and the folks on the WebEx will know, there, that you'd like to make a public comment, when we get to that point in time.

I'd also like to welcome some folks. We have new folks around the table for this afternoon. Welcome to you all. Thank you for joining us. And as you have

probably gleaned, we're having a little bit of a Q&A discussion with our presenters. So, please feel free to weight in, there.

And I will turn it over to Tim, to welcome John.

MR. OLSON: So, I'd like to introduce John Tillman, representing Nissan Corporation.

So, we're looking forward to a view, of an automaker, about EV growth and the need for electric vehicle infrastructure.

MR. TILLMAN: Hello, everyone. First, I'm going to say, right off the bat, if anybody's expecting me to do a product launch, rollout, no.

(Laughter)

MR. TILLMAN: Yeah, I find that that's useful in certain situations. But I think in this case, looking at the audience, and the kind of presentations, trying to get at the core of what, at least one OEM sees as some of the problems, is more useful for your benefit.

So, essentially, what you're seeing here, and I'll say right off the bat, this is not Nissan's path order plan. This is not something, a corporate idea of everything we see and the timing we see necessary.

This is one idea of several scenarios, several things put together, and the timing they'd have to be put in place, in different phases.

Conceptually, if you'll look at the way I've laid this out, and on the bottom line where, at this point in time, when this was made, what kinds of numbers of vehicles CARB is expecting in the marketplace.

You can reasonably go through and figure out, you know, there are many, many factors. There isn't just the vehicles that we bring to market that have to be considered.

The kind of infrastructure that's available, both at work, at home, and in the public space, meaning out and about, in the wild. The kinds of availability of MUD type charging going on.

The pumps we're seeing, now. I actually had thought, when I developed this, and I should say I developed these back in 2011, the MUD would be figured out by this point. That by the time we hit the '15-'16 time frame, we would have sorted out the MUD issue. I was very wrong.

So, going forward, many of the things you actually see in phase one, on this chart, haven't been sorted out, now. So, we're not even going to get to phase two with some of these things, until those are sorted out.

So, phase two being the business case development. We're just starting that with some things.

But on the infrastructure side of it, business case development for level two chargers in the wild, that I'm aware of, there really isn't one, yet. There really isn't one, yet.

As my colleague, Kapil, pointed out, you know, the cost they're seeing per month, the kind of revenue they're getting from the charger, it doesn't work. It doesn't equate. You can't, actually, make a business case, yet.

So, I'm a little scare, going forward, that was is the growth of the EV market, when there isn't a business case for the chargers necessary to charge the vehicles.

The State, and the CEC, PUC, cannot fund the large numbers that we're going to need to see in the marketplace.

And also, back to the consumer. Someone pointed out that consumer education is a huge component. Absolutely agree.

The question is, from an OEM perspective, how much of that consumer education can we do in the showroom, or online, with information that the consumer looks for. And how much is necessary that they must know, going into the showroom.

How much has to be done by the utilities, to

some extent, about the cost, about the installation, about where they can help, where there are funds available?

But this is naive. The consumer, the technology side of it, the last few years, we have seen huge issues with cyber security. The concept of a person being able to plug in their vehicle, and just charge it, no other information needed, other than they plug it in, they walk away, and they don't need a credit card -- essentially, charge roaming is being what I'm talking about. How do you identify the customer, the car, and not consider cyber security. Because you then have, on the vehicle, all the information necessary to identify that customer, their address, their charging habits, their driving habits.

And so, these are all questions that we have to answer for this market to grow to where a customer can just go out, charge their car, and not think about it. We're not there. We may not be there for quite a while.

And then, looking at the market growth issues, it's highly dependent on the utilities' and the vehicles' regulatory issues. This is just a small issues of the regulatory issues that we all see, in this room, associated with this technology.

On the vehicle side we're seeing, now, over the

last year, DMV use fees on the electric vehicles. EVMT is being discussed, very heavily, over at CARB. We also see issues associated with greenhouse gas emissions which you, of course, deal with as well, but we see as tailpipe emissions, and so forth.

But we're also seeing, now, customer questions about incentives. You know, what about the vehicle incentive for the purchase of the vehicle? They're diminishing, plain and simple, where we're at now, the incentive we see, now.

And as much as one of the previous presenters commented, they depend on the LCFS. At this point, we are pretty dependent on the incentives, EV incentives, that are diminishing.

And as we move forward, as this technology is required to be bought by the average demographic, and when I say average, the average household, whose income for a family of three or four, is $56 to $58 thousand a year. They're buying one car. So, they're going to be far more dependent on the incentives than the previous purchasers have up until now. So, the diminishing incentives is going to become a huge problem for the market growth, as we move forward.

It's not that the OEMs want to be dependent on the incentives. Right now, and going forward in the

demographics, we have to sell these cars, we're going to require incentives that these vehicles, and their limited range, and the charging issues associated with them, that this is a viable technology for them.

So, growth, again, is a question mark going forward.

So, going into what, at least Nissan sees, as a case for a broader range of DC fast charge, right now, and I went through the 2010 Census to come up with all of this information, with the exception of the 98 percent, which I got from a combination of the 2010 Census and the Small Business Administration. There are 60 million private garages in the U.S., for 140 million light-duty vehicles on the road. Again, the 2010 Census.

At that time, 63 percent, and this was borne out by my question to the POUs in the room, about what is the ratio of people living in MUDs versus people living in private residences, 63 percent of the residents live in multi-unit housing, where installation of charging units isn't in their control, and is not feasible by the landlord.

Now, it's not feasible without some kind of incentive, whether that incentive be taxed based, or whether it be a direct incentive from either the utility

or the State, not pointing out the differences. But that's a big challenge, I know, 63 percent, and where are they going to charge, then? They're going to charge at work, they're going to charge at home. Home is not an option for this group. They're going to charge at work.

But we go to the next point, is 98 percent of the U.S. workforce, and I know this is a question for some people, are employed in locations with less than 20 workers. Now, when I say 98 percent and 20 workers, it's not meant to imply that those are all small businesses. Starbuck's, for example, most of those locations have 20 employees or less, per location, but they don't own the property. And they're not going to, necessarily, install chargers for their employees. They're going to be installed for the benefit of their customers. So, the employees will not be able to charge at those locations.

If you look at all the other, small, mom and pop businesses, many of them do not have a large number of workers who will have these electric vehicles. And the ones who do, maybe one or two. But again, a majority of them will not install these kinds of chargers.

So, if you've knocked out a large majority of people who don't have home charging, 62 percent,

potentially, if you've knocked out 98 percent who may not have work charging, what are you left with? You're left with, as Bill mentioned, a gas station model, where DC fast charge is the only way you're going to charge these people, in a short enough time necessary to make it feasible for them to buy the technology.

So, again, the growth of EV vehicles in the general market challenge, if we just look at workplace and home charging.

So, looking, specifically, at California's level two infrastructure, up to now, if you look at what's called an attach rate, and an attach rate is a relationship between electric vehicles and the public EV ports.

There was a study done, several years ago, that the sustainable attach rate is 50 percent. And you could argue that's probably not correct, if you've got home charging.

But let's say that, if you don't have home charging, a 50 percent attach rate might be correct.

But right now, we're closer to the 5 percent. And the same study that indicated that the 50 percent was the correct number, indicated that 5 percent was not sustainable.

I went a little further with that and looked at

what would that mean in 2016, for a 50 percent attach rate, for the amount of chargers we need, for the number of vehicles we had as of June 2016. There were around 223,000 electric PEVs, on both plug-in hybrid, as well as battery electric. That would mean, now you could argue that the PEVs wouldn't necessarily need to charge at that. But that would mean you'd need 111,000 chargers in California, alone.

But the actual charge force is 10,000. So, 10 percent of what would be needed for the 50 percent attach rate. We're closer to the 5 percent attach rate, now. Which, as it indicates here, is not sustainable.

And getting into the dollars that would be required, it was around $542 million just for level two, just in California.

Now, nationwide, as someone indicated, and this is going back as of April of 2015, so this is a little dated information, but it's actually gotten worse. Nationwide, we have around 14.2 electric vehicles per charge port. California's actually worse.

Now, to give you an example, my Tesla colleague is here. He may correct me on this, please, but I heard there are 35 Tesla vehicles per charger, more or less. So, this number is borne out. There are quite a few more vehicles, than there are chargers.

And that becomes a problem, when you consider we're trying to grow this into the multi-unit dwelling market, who has to buy these vehicles, and they're going to depend on these public chargers. And, yet, there aren't that many chargers available.

So, one of my colleagues made this slide, and the viewpoint from Tesla -- ah, from Tesla -- from Nissan --

(Laughter)

MR. TILLMAN: -- is that there has to be the five R's of the building blocks for the national charging network. Reliable; redundant, meaning multiple chargers on one location; relevant, meaning it has to be able to service all the needs of the chargers, whether it be a CHAdeMO, a CCS, or whatever the vehicle coming up to it; rapid, goes to the AC versus the DC fast charge; and regional.

There was a colleague that came up to me, and pointed out, that the needs of people in Lodi, as a municipality, are not the same as those in Palo Alto. So, the amount of chargers necessary in Palo Alto, in a public space, will not necessarily be the same as the amount of chargers necessary for the same volume of ratepayers as you have in Lodi.

And that's a very excellent point, that I hadn't

specifically thought of, was that we need to make sure that we're not putting the same requirement on Lodi, as we are on Palo Alto, in the kinds of chargers, the amount of chargers, and types that they're going to need.

And then, this is specifically from a survey that they did, Nissan did, to its LEAF customers, and a site that we actually have, where there is a level two and a DC fast charge on site. Now, the wait time expectations of our LEAF customers was, they would rather, you know, wait less time, 10 minutes or less, 10 to 11 minutes, 11 to 15 minutes. And the farther you go up, in the amount of time, the less interested people were.

In that same survey, we actually had one location where we had available two, and the DC, and only eight percent of the charging sessions were done on the level two. The majority of them were done on the DC fast charge.

You could argue it's because it's the amount of time they had available, you could also argue because of preference. They just chose to charge at the DC fast charge, over the level two, on the same location.

You know, in that same survey we also looked at what would -- where people who actually purchased, non-

purchased. People who rejected it, didn't buy the car, and why.

And for the most part, it came down to infrastructure was the highest reason they chose not to buy it. The lack of availability, the lack of knowledge of availability.

So, while I would argue that, yes, the vehicles that the manufacturers bring to market does have a great deal of impact on the penetration of these vehicles. It is by no means the only factor.

The amount of infrastructure that they see, driving down the freeway, seeing a sign that points, you know, DC Fast Charger at this exit, or chargers at this exit, will go a long way to making the average consumer feel like -- oh, I can -- at my next purchase, I'll go look at that. I'll think about it because I'm seeing these chargers everywhere.

Until they see these chargers, whether it be DC or level two, ubiquitously, wherever they're going, they're starting to see them and start to think, I can use this technology, unless they started, it's not going to even come in their mind to even consider the technology, when they go purchase their next car.

Again, the growth is a challenge until these kinds of things become part of every day, driving

around, and consumers seeing this.

And then, Nissan, actually, has already done some work, and partnered with a couple of utilities, back East, and I think some of the other utilities, in California, to co-invest in the installation of level two infrastructure for their worksites.

This is an example here, of what we actually have one it with Georgia Power. ADP, Cox, Chick-fil-A, just to name a few. So, we do find a great deal of value in partnering with the utilities, to help them, as well as employers, to help them provide infrastructure for both their employees, as well as their different projects.

In conclusion, I would say, the lack of DC public fast charging, in high density urban environments, and this goes to the point that one of the presenters made, when people are applying for a permit, for a new installation, that’s great. Requiring installation of chargers, not necessarily fast chargers, but level two, even, as part of your installation, before you sign up for the permit, that is fine.

But that will capture the new installation. We need to also capture the upgrades to existing infrastructure, which are far more expensive to upgrade, and will actually be where the core of many of these

urban dwellers are going to be.

They're going to be in the middle of San Francisco, for example, or San Francisco, in general. I mean, how many new, high-density apartment buildings do we see in San Francisco? They're all downtown. You know, the really nice, high rise ones.

When you go farther out, and you see the three, four, five story ones, those are new, but what about all the existing infrastructure, existing buildings? We need to consider those in our building requirements.

Meeting ZEV targets, also, as I mentioned before, the average consumer, the average income, that is going to be a challenge going forward.

Incentives and tax breaks are necessary for businesses. And, when I say businesses, I also include owners of large MUDs. Now, it usually is a corporation, or multiple corporations, maybe, but a major corporation owns a large apartment building, it's not an individual. They need to be given some kind of an incentive for them to want to install this in their MUD.

Range, capabilities, they're changing. Right, now, we're looking at -- the BOLT came out, it is 235 plus mile ranges. We have the Tesla Model 3 coming out, as well as the Model S. Nissan's coming out with their own version, in the future. The capabilities of these

cars are going to change the kinds of charging events that we see.

And a lot of people, I've asked this question several times to people, how often do you fuel? How often do you refuel your car? A quarter tank, a half tank? A lot of people say, quarter tank, they go to refill their car.

Let's say they do that with an electric vehicle, and they have a 200 plus mile range. So, they're going to refuel their car when they have a quarter of their range left. That means, they're going to refuel 40 kilowatts of storage.

Are they going to want to do that over at a level two, or are they going to do that as quick as they can and move on?

So, consider that battery ranges are getting larger. It used to be that 100-mile was the expectation, 200-mile was the stretch. Now, we're seeing 200 miles becoming the expectation, 300 is the stretch. It's going to probably move up, where it's going to be 300 is the minimum, 400 is the stretch.

To meet the targets of the ZEV mandate, and the regulations that we have on us, we're going to need to have replaces the existing vehicle range and vehicle times. That's DC fast charge. At least, to Nissan, it

is.

I'm not saying that workplace charging, at level 2, and home charging is absolutely not required, they are. But for the demographic segments that we're looking at, who are required to buy these cars, who don't have home charging, and may not have workplace, DC Fast Chargers, the way they're going to need to do it. And that's it.

COMMISSIONER SCOTT: Great, another thoughtful presentation.

Let me see if I have questions from folks. Go ahead, Shiva.

MR. SWAMINATHAN: So, I have heard that fast charging every day will fry the batteries. Is that true?

MR. TILLMAN: Talking to my vehicle engineers, no. Now, have we seen instances where it has reduced the battery life? In some earlier ones, as I understand it, it did. Our current battery chemistry, it's not such a big deal.

I would actually, maybe, ask our Tesla colleague the same question? I don't know.

(Laughter)

MR. TILLMAN: The only other OEM in the room. But my current information is it doesn't have as large

an impact as we once feared.

COMMISSIONER SCOTT: Okay. Amy and then Kapil.

MS. MESROBIAN: Hi, John. From the CPUC perspective, I'm really interested in the multi-unit dwelling sector. We've had some utility and other investments in that sector, and it's been a really tough sector to get into, as you've mentioned.

And so, the idea of DC fast charging plazas has been floated, and it's something that we'll think about.

I'm wondering, from your perspective, do you see that as sort of a short-term fix to get people, who are used to going to the gas station, into these charging plazas, or do you think it's kind of a longer-term thing? Or, longer-term is the idea situation that charging is just sort of embedded everywhere, so people don't actually have to make charging a separate errand, where they go out of their way to get gas, or to get their fuel, and it just becomes more kind of embedded into their daily lifestyle?

MR. TILLMAN: I would pose to you the idea that the consumer wants to, at least currently, they want to have something similar to what they have now. Which means they may get fuel on their way to run an errand, and it's just a stop. It's a short stop, five, ten minutes to get it, and they go on doing their errands.

With the current infrastructure, that's not possible. You would need to make a special stop in the public to charge your car, for a long period of time. That could mean you would stop your car, while you're doing your shopping, or while you're doing something else, as part and parcel of that errand.

But going forward, the indication so far is that the longer it takes to charge, that's just one more thing to add to their list of things to do.

So, stopping on an island, if you will, a fueling island, it kind of goes toward the model of a gas station model. They're stopping for a short period of time, and then they're going on.

I don't have a crystal ball to say whether that's going to be the thing that is going to be the choice of preference, but I expect that -- the expectation, I think, in Nissan, is the faster someone can charge, the more likely these vehicles are going to be something viable.

COMMISSIONER SCOTT: Kapil?

MR. KULKARNI: Hi, John. I had a question about the relationship between the price of EVs, and they're a lot more available now, versus the infrastructure problem that you noted. So, you know, over the last couple of years the price of the LEAF has dropped. Has

that resulted more in an increase in EV adoption, despite customers citing infrastructure as an issue?

MR. TILLMAN: Price of EVs has dropped, the LEAF has dropped. Unfortunately, I don't think we're still making a profit, yet. It's not because we were able to lower the price. It's, frankly, because we've needed to drop the price to keep the sales moving. So, I think that will answer that part of the question.

As far as the infrastructure side in relation to that, I don't think I can answer the question, to be honest. So, do you want to rephrase the question a little differently, maybe, or --

MR. KULKARNI: Well, everybody's wondering if customers are willing to -- you know, if the price of a LEAF was, say, $300 a month, and it goes to $199 --

MR. TILLMAN: Which it already is, actually.

MR. KULKARNI: Yeah. If they're willing to overlook the infrastructure, they'll charge inconveniently, if they need to, and kind of wait for the charging infrastructure to catch up?

MR. TILLMAN: Early adopters have, for the most part, seemed to have had the ability to charge, either privately, or at work. You know, the carpooling, for example, there is a large number of chargers over there, but they still have to rotate the vehicles to get them

all charged.

Many people, quite a few, are purchasing the LEAF vehicles and are not installing level two chargers, they're just using 110.

But that is something, I think, particular to now. People are able to charge using the chargers that are available. But going forward, when they're buying this vehicle and they're living in an MUD, that may not be possible.

So, we haven't yet hit the point where a lot of people, who are living in multi-unit dwellings, are buying the cars. So, we don't know how much of an impact the availability of charging is going to affect, versus price.

So, if we -- how far do we have to lower the price to make the charging issue go away, as a consideration? I don't think -- that's kind of the question. How much would you have to lower the price of a car if there was only one gas station, if it had 15, 20 cars lining up to be gassed every day, and we're running out of fuel every so often, you maybe couldn't even give the car away, if it wasn't useful to them.

So, I don't think there's a price, where we could lower the car enough, if they didn't have access to infrastructure to charge it.

COMMISSIONER SCOTT: I'm going to take a last question from Shiva. I recognize we have a couple more, but I do want to make sure we have a chance to get on to all of our presentations. So, go ahead, Shiva, and then we'll go to the next presentation.

MR. SWAMINATHAN: We've heard, in some of the presentations today, that level three charging cost, per kWh, is going to be higher than in level two so, say, 50 cents per kWh. That's 15 cents a mile versus -- so, it's higher than gasoline costs.

Have you factored that in, when you articulate that level three is the way to go?

MR. TILLMAN: Have I factored it in? No.

(Laughter)

MR. TILLMAN: We do know that they're more expensive, there's no question about that. But the utility to the customer, and the potential price thing, we've actually talked about this, internally, and maybe there has to be different levels. As someone mentioned, a 25-kilowatt option, a 50-kilowatt option, a 120-kilowatt option. You have your super and then your premium.

It could be that, you know, you have the higher level of infrastructure capability, you know, if you have a higher cost for that convenience to charge in

five minutes, or two minutes, or whatever. So, maybe that's one way to cover, recover some of those higher costs, with the higher charging.

I fully would expect that someone would pay more for DC fast charge, versus sitting at level two for, you know, six to eight hours.

So, I think that's the way to think about it is you're going to have to recover the cost for the higher expense by charging more for that higher charge rate.

COMMISSIONER SCOTT: Let me just, John, even though I said last question, I won't phrase this as a question. But what I think I heard you say, or I'm taking the liberty of summarizing what I think you might have as advice for the POUs, as they're doing their integrated resource plans for transportation electrification.

And that's to consider, as they're planning the need for that faster charging, and what that might look like in -- and you didn't say what that might look like in a load curve, but I'm kind of adding that on, right. If you're going to have a lot more faster charging, and the faster charging is going to continue to get faster, what might that look like in a load curve, as you're considering integrated resources planning.

And then, just the need for more infrastructure.

And as the infrastructure continues to build out, to meet those additional cars that are coming, how that may also impact the load? I mean, is that a fair characterization? And if it's not, I'll ask you to --

MR. TILLMAN: I would say that's fair. The one thing I would add to that is look at, in their utility rate base, at the MUD question. How many -- how much or what percentage of their population live in MUDs, and consider if they're not purchasing them now, the regulations that we have on us, at least, require that they're going to have to purchase these cars to make it work.

So, figure out a way to get charging level twos, in your MUDs, in ubiquitous numbers. If you don't do that, or can't do that, your only other option is going to be for them to purchase it, to have to DC fast charge.

So, it's not a matter of -- it's sort of more of how you think about it. You either facilitate MUD charging, or you work on DC fast charging.

COMMISSIONER SCOTT: Thank you, very much. Another terrific presentation.

So, I'm going to turn it back over to Tim, for our time check.

Dan is next. We'll have until about 2:25 to do

both your presentation, and the Q and A.

And I will turn it back to Tim.

MR. OLSON: Okay, so Dan Bowermaster, from EPRI, Electric Power Research Institute, is our next speaker.

MR. BOWERMASTER: All right. Hi, everyone. I'm Dan, from EPRI. And I think a lot of you know EPRI, but this is how I explain it to my relatives, at Thanksgiving. So, we're a nonprofit that does applied research for the utility industry, but we exist for the public good. Which means that, yes, the utility, and State, and local, and federal governments fund us, but they may or not like our results. But, again, we exist for the public good.

So, we do applied research. We try to solve short- and long-term problems.

So, I'm going to talk a bit about sort of the state of the national market, I'll dive a little bit into California, and then we'll talk about kind of what's coming, as far as vehicles go. And then, environmental impact, both nationally, and as part of California, and then kind of looking ahead real quick.

So, we all know this, but I think it's important to keep in mind that, you know, especially when we start looking at greenhouse gas, and especially air quality, it's not just the light-duty vehicles, but it's

everything from the chain saws, and snowmobiles which, obviously, there are not so many snowmobiles in Sacramento. But buses, and big things that move goods and people around, that fall into the bucket of transportation electrification.

Now, there's been a lot of good news, recently. I think you might have heard that, you know -- you know, on the one hand you have the ZEV Mandate that's start of encouraging on this, and then on the other side you're starting to have some competitive things flowing, so it's kind of the best of both worlds.

But I think it's important to remember, the daily headline doesn't really matter, what pops up in the *Wall Street Journal*, that might, you know, get a lot of attention, but it's kind of a long-term plan. This is just an illustrative chart, that I think we got from CARB. But it's important to remember we're still in the very, very beginning. So, this is a California perspective.

So, a lot's coming, and a lot can change. There's a lot of hard work that's been done, and remains to be done.

So, this month -- I mean, this month -- in September, national sales, national cumulative sales topped the half million. So, that's a big deal. Now,

it's good news, bad news, right?

So, the challenge is 240,000 and change of these sales were in California. So, it's largely, so far, a California phenomenon. You know, you go to Tennessee, you go to other states, not to pick on Tennessee, but it came to mind recently, but there are very, very few cars that are available, as far as customer choice.

But still, you know, a half million plug-in electric vehicles is nothing to sneeze at, so that's great.

And also, the trends. So, sales are up, 2016 over 2015, up 34 percent year to date. So, you kind of look at 2010 -- well, let's call it 2011, 2012, 2013, 2014 there was decent growth. And 2015 compared to 2014 is about flat. And then, 2016 over 2015 is, you know, solid numbers so far. And again, you know, it's a marathon, not a race.

So, I don't get too excited or pessimistic telling you about the good news or the bad news, but I just thought it would be a good kind of spot to check in, for everyone to know where we stand in 2016.

And, you know, we see this all the time. We saw this -- I think, as some of you know, I used to be at PG&E, and then I came over to EPRI. And, you know, there was this whole thing, back in 2010, when the LEAF

and Volt, and then you have the Tesla, the Roadster, where everyone was so excited.

And, you know, I think one of the mistakes, at least we made, was we were so excited about the cars coming, they're real, that we forgot to kind of like ratchet down our own, internal estimate. So, it's going through this like, you know, this hype phase.

But now, you fast forward six years later and it's like, oh, these things are here, great, and there's a lot more competition. And it's not just about the light-duty cars, or the forklifts, or the buses, and we can all kind of argue where, on this chart, different products fall.

But the point is, you know, some of this stuff, like forklifts are a no-brainer, today. So, if anyone runs a warehouse, or knows someone who runs a warehouse, they're competitive, they get the job done, and people who have them, love them. And then, you know, everything else kind of falls on the spectrum.

So, the next two slides tell the same info. This one's the pretty one with pictures. And what's good is this slide's already wrong. There are 43 cars, now, that are specific new, or heavily revised plug-ins that are coming out, their starting this year, through 2020.

And why that's important, and this broken out by kind of product class, again, good news, bad news, the good news, you're seeing less of the, quote/unquote, city car, or hatchback, but they're still there, too, but more and more of the kind of stuff that Americans love to buy, which are kind of the crossover SUVs, minivans, things like that.

In fact, if you look at seven of the ten bestselling vehicles in the states, every year, the number one is the Ford F-series pickup, you know, about three-quarters of a million. But I think, six or seven of the ten are trucks, SUVs, or crossovers. So, that's good, we're starting to see more crossovers, which Americans like to buy.

Obviously, the bad news is, there's no full size, or even midsize truck out, yet, although there's rumor that there's one to come out at the end of the decade. But like I tell my advisors, don't quote me on that. So, that's on the product side.

Now, let's talk, a bit, about the grid and emissions. So, EPRI, and the National Resources Defense Council, and I don't see anyone from NRDC here, we've done two studies on kind of what happens when you broadly electrify the transportation sector. We did it in 2007 and, again last year, in 2015.

And it's kind of the "Captain Obvious" study, some people call it. It's like the grid is, yes, the grid pollutes, but it's clean and it's getting cleaner. So, as you clean up the grid, and then you're also cleaning up the carbon, it's all beneficial for everyone.

So, these are kind of just -- this slide, the goal is just to show you kind of a frame of reference where the grid -- how much the grid's gotten better with three main pollutants. You have carbon dioxide up top, in the blue, and the middle is sulfur dioxide, and oxides and nitrogen down at the bottom, which has, obviously, been in the news, recently.

There's huge improvements in the grid. There's still a ways to go but, you know, everyone's working on it. But the grid is getting cleaner, and as it gets cleaner, everything that plugs into it gets cleaner, both if it has wheels or not.

So, this slide looks -- on the left, you see greenhouse gases which, you know, is the kind of the boil-the-frog problem, the climate. And then on the right, it looks at what happens when you electrify the -- just in California, what happens as you electrify the transportation sector and the improvements to kind of ground level.

Now, I had to relearn this, there's upper level ozone, which is actually good, it's like an umbrella that protects us. And then, there's ground level ozone, which is bad, because that combines with a bunch of other stuff in the air, that basically gets into your lungs, and shortens life, especially if you're very young or very old.

So, what this shows, and especially, this is especially important for our friends in Southern California. Basically, the green is good and the blue is -- the blue is really good, as far as improvements to air quality.

So, again, you know, the "Captain Obvious" study is that, you know, by cleaning up the grid, and the electrifying transportation, you kind of take care of the two big -- the two big inputs into pollution, in society.

So, we've heard it from other speakers, but I think one point I really wanted to emphasize is that, you know, all this stuff we're doing, it has to go faster, it has to scale. It's good, all the pilots we're doing, that's how we learn. EPRI and other people do pilots, and that's all great.

But we have very aggressive goals, especially in the State of California, and what this looks at, you

know, the diamonds with the goals.

The line at the top kind of shows what happens to societal greenhouse gas emissions if you don't -- without transportation electrification, it's just kind of business as normal, the grid gets cleaner.

And then, the next one, the green line, is what happens if you have like a -- call it a moderate, or kind of business as usual, you know, RPS, you know, the grid gets basically -- it gets slightly cleaner, but nothing super crazy. That's the green one.

So, then, if you have a pretty aggressive RPS, that's the bottom line. So, what it shows is that, you know, more is needed sooner. That's not to say that the goals are bad or what we're doing is bad. It's just saying that, it's a reminder to all of us that, like, in order to hit these goals we have go, we have to scale, we have to do this, now. Which, again, I'm sure everyone here knows.

This slide includes -- I included this for us, and I could quit here, now, because I'm sure you guys have seen these articles, or heard about it, you know, over water or coffee, or something. It's like, oh, I read this article from a great university, or a great place, that said, oh, you know, driving your electric vehicle's actually more polluting. And a lot of places

have done studies, and everyone means well.

But the root cause, we had our experts kind of dig into this, is if you take old, good data, like four or five slides ago, if you take, you know, 2003, 2004, 2005 data, yeah, the grid was dirtier back then. So, if you extrapolate that out, it looks way different than the grid is, now. So, it's all about using -- not only modeling correctly, and getting the right data.

And the black dots are where the grid is actually at. And all the other ones are different reports and things. So, you can see on the Y axis, you know, the grid's right around 250. Some of these places are two, almost three times, assuming more polluting than the grid actually is.

So, again, I'm not saying these studies are bad, it's just always about the assumptions.

So, customer education. I think, you know, the POUs and the utilities, big and small, have done a really good job, and it's hard, to get together with stakeholders, educating their customers, and it's a shared customer.

And, you know, we're all creatures of habit. We think about getting gas. But at the end of the day, it's you sometimes get gas, and you sometimes really need to get gas.

But a lot of times, you know, you can charge at home or you can charge at work. We've talked about, you know, if you live in apartment, or a condo, you know, you don't have access to a plug, you know, it's tough. This kills me as -- and I love cars. But if you look at the car sit, like 22 hours per day, and that just kills me, especially when you think about the money involved.

So, the point is, there's actually quite a bit of flexibility as far as how much car sit. There, the question, is how far away is that plug and how simple or complex do you make the technology to do what we need to do, kind of as a society.

So, when people ask, like, well, how do you charge your car? And my response is, well, can you charge your Smart phone. And they're like, well, yeah. And I'm like, well, that's what my -- that's what our family's been doing for the last few years. And, I mean, we're lucky enough to also have workplace charging. And again, that doesn't -- (inaudible) -- but the point is, is like you don't -- it's like gas, you know, when you drive across Nebraska, or someplace like that, you don't need gas, you don't need gas until you really need gas, and then there's that one, lone gas station out there, and can like charge $8 a gallon. They normally don't, but you really need it.

So, it's kind of the same thing with DC fast charging, which is a slide I'll get to in a second.

So, more good news, bad news. There's more and more infrastructure being put in, private/public partnerships. This is just some data we got from Plug Share. It doesn't have all the Tesla stuff on here, I'm noticing, so my apologies to our friends at Tesla.

But, you know, I think Tesla's, you know, done a great job of helping their customers. Again, a lot of them probably charge at home, they have a huge battery. But if they need the supercharger or want the supercharger it's there, they can go wherever they want to go. It's pretty -- it wasn't easy for Tesla to put in all those superchargers.

I think one issue and, you know, people have heard this before, is that -- and it's being worked on right now, is the -- you know, basically, if you're driver, you know, how many cards do you need to basically access that machine. You know, I've had this personally happen, you're in a parking garage, and don't have a card, there's one, great, but I don't have cell reception, so it's -- I think this kind of stuff will get solved. You know, this isn't -- this isn't impossible, impossible things. I think this is more kind of growing pains, so I'm not too worried about

this. But it's kind of the reality right now, that some of this is more fragmented than others.

You guys have heard the news, you know, today's all about the POUs, but the IOUs also have been doing -- and the IOUs, and also states and provinces across the North America have done a lot of -- also have a lot of proposals to put in charging infrastructure, in different forms. Some are all in, some are kind of, you know, up to the stuff type of thing.

And, you know, their pilots, we're all gathering here, trying to see what works, and maybe it's climate specific, or cultural specific, or what have you, but there's just a lot of money going in right now, across the country.

So, this was the slide I was thinking of. And you might be, like, why the heck are three, tiny charts, that are impossible to read, even for the folks close, and then a picture of a beach. That's a very good question.

I'm not trying to waste time, but the point is customers don't care. They want it easy, they want it reliable. Yes, fleet customers, or there's going to be some folks that are really dialed in. And, yes, there's some specific customers, in every utility's territory, big and small, that have the Excel sheet, and that's

great. But at the end of the day, they don't care about all this mumbo jumbo. They just want it to work. If there's a program where they can roll into work, and plug in, and the car flips on, you know, whether there's a timer on the car, or the utility sends a signal, or their building sends a signal, they don't care. They just want to, you know, charge their car. And if they're pregnant, if their wife's pregnant, they just definitely want to have enough juice in their car.

So, the point is like, again, this is something that Tesla's done well, is that they've really enabled the -- like, people don't worry about it, they just drive pretty much wherever they want. A combination of battery size and then, the high-powered charging.

So, this is the last slide. So, in the future, what's coming? Well, the Google car almost ran me over the day. Well, I shouldn't say that. I was out walking the dog at night, and it drove by me, at my in-law's place. So, you know, the cars are out on the road. You know, there's way more human error, than there are autonomous vehicle error.

If you look at kind of the finance of the autonomous driving, I'm sure there's financial experts in the room, but, you know, electric vehicles, and kind of how you set the ownership model starts to make a lot

of sense.

We heard earlier, I think Marvin mentioned it, from L.A., that the Lift drivers and the Uber drivers are already using fast chargers. So, I think there's a lot of potential there.

You know, I was at a talk, last week, with the head of -- one of the leaders of BMW. And he's like, yeah, you know, it's a five-step process. You know, first take away cruise control, it's been around since the 50s. And then, all the way up stage five. He's like, we're not as far -- the media thinks we're at stage four or state give, but the reality is we're only at stage three, you know, two or three. Now, we're getting there, but it's not there, yet.

You know, high-powered charging, whether it's on the light-duty side, and/or on the truck and bus side, I mean, that's coming. We've talked about that. And I agree, you know, previously we heard -- I can kind of see a charging plaza where you pay for -- you pay for your time. If you want premium, you want a quick blast, then you pay for it. If you're just like, I'm here with my three kids, and by the time we all get through the washroom, and get a cup of coffee, we're going to be here 20 minutes, anyway, I'll just take the lower one.

You know, again, that kind of comes down to

customer choice. How you all finance that, and maintain it, it's definitely the industry -- the broader industry, in general, is working on.

And then, you know, again, and I think John kind of nailed this, that the second you do something awesome, the awesome becomes the new norm. You know, you have a 200 mile, a 230 mile range car and it's awesome. Right? Now, everybody's like, well, we can do that, we'll get you 300 or 400. You know, obviously, there's a finite, there's going to be a limit there.

But the technology is great. It's working well. The batteries are great. They're working well.

And then, you know, the ownership, car sharing, I'm too old to be millennial. But, you know, you see it and I am curious how that's all going to pan out in the future. But I think, again, that might -- that also might lend itself, based on financial modeling, to electric vehicle at the time of this -- but I don't think that it's going to be 100 percentage, it's really going to depend.

So, there's a lot to be -- I would say, from the utility side, you know, there's a lot to be learned and a lot to be understood. You know, I have that picture -- I dug up this picture of the Interstate highway systems. You know, it wasn't that long ago that we

didn't have an Interstate highway system.

So, is it going to be -- you know, is it going to be regional high-power regional DC fast charging, is it going to be a national vision, is it going to be a mixture? You know, we don't know. There's standards to be worked out. There's technical stuff, financial stuff, but that stuff is coming soon. And, you know, the buses are here, the cars are here, and we're going to see more of it. So, I think that's it for me. There.

COMMISSIONER SCOTT: Excellent. Thank you for your great presentation.

I had a question for you in terms of the information that you presented to us, all of which is fantastic, and very interesting, are there key components or takeaways that you would highlight, for the Energy Commission to think about, or for the POUs to think about, as -- you know, as we're thinking about how we put transportation electrification into the integrated resource plans?

MR. BOWERMASTER: Well, EPRI doesn't comment on policy.

COMMISSIONER SCOTT: Or planning?

MR. BOWERMASTER: But I can say, you know, as simple as it can be made for the customer is one thing.

COMMISSIONER SCOTT: Uh-hum.

MR. BOWERMASTER: And then, on the technical side, again, I think it was Marvin who mentioned, you know, ways to stretch the dollar further. You know, we were even talking about it at lunch.

COMMISSIONER SCOTT: Uh-hum.

MR. BOWERMASTER: Like, are there ways to do ownership models, or financing models, where everyone takes different pieces that they're best at, so the dollars can go further.

You know, there's kind of like five ways to financing charging infrastructure, and it's really tough. Most of them are really, really tough. You know, utilities have the advantage -- not POUs, but IOUs have the advantage of a longer-term capital return on investment than, say, you know, like what Wall Street typically expects. So, they have that advantage there, but it's still hard. So, you know, any way you can make the dollars go further, the better.

And that, you know, high-powered charging is coming, in one shape or another.

COMMISSIONER SCOTT: Great. Kevin, anything from you?

Let me see, Jim or Bill, I know I missed you guys last time. Do you have anything you'd like to

start with, this time? No, okay.

Bill?

MR. BOWERMASTER: Ask me the other question, I'll see if I can answer it.

(Laughter)

COMMISSIONER SCOTT: Go ahead, Bill.

MR. BOYCE: You know, I know we spend a lot of time looking at, you know, the growth of, you know, hitting he policy. But I'm wondering, with things like autonomous cars, cost of transportation, if there isn't longer-term scenarios where the number of cars actually flattens or declines.

And this gets to the point, okay, sure, cars, I don't need as many. You know, how far out in the scenario that goes. If you start talking that, we're probably also talking wireless, inductive charging, and I haven't heard anybody bring that up, when we get into those future scenarios.

So, that was one -- that was the last zinger I was going to toss John, on the last one. But you guys might be looking at that type of stuff, too, with the longer-term trends.

MR. BOWERMASTER: Yeah, that's -- even within our team it's hotly debated. You know, some people think we'll have fewer cars. Some people think we'll

have as many, or more cars, just they won't be parked, they'll be on the road.

You know, my dad's a civil engineer, so as a kid I remember learning about what causes traffic jams. And it all comes down to, at least, my ego, thinking I can drive better than the next guy, and it causes the wave effect.

So, I think that, you know, if you look at, too, the different, kind of where people live, in the high population-dense areas, you know, Sacramento Metro area, San Francisco, San Diego, places like that where, you know, you have, basically, all these cars there and, you know, we humans are impatient. You know, kind of an autonomous, Uber model might work well.

But if you live up in -- you know, I'm from Humboldt County, and there are definitely rural places out there, where I don't want to be waiting two hours for a car to show up that, hopefully, would get to me.

You know, so I can see, maybe, in places where it's more dense to do some kind of autonomous car. And there has to be -- as far as I understand it, there has to be, also, some investment on the infrastructure. Not on the charging structure, but on just the city infrastructure side, in order to have true autonomous cars in order to get to that stage five. So, that's has

to come, too.

It's not just putting all the smarts on the cars, they have to be able to talk to the traffic lights, and all that kind of stuff.

COMMISSIONER SCOTT: John, did you want to weigh in at all on Bill's -- you don't have to, but if you do.

MR. TILLMAN: We've actually looking at that question, specifically. And with Millennials getting their licenses, if at all, later and later, and their preferences, it would appear, to communicate, even literally at the same table, texting each other.

(Laughter)

MR. TILLMAN: I found that amazing, when I've seen it several times. We're starting to wonder about the vehicle ownership model in the future. And you add to that, Uber and Lyft model, with autonomous vehicles, in Uber or Lift model. Where all they do is they text, I need a car to pick me up here, in 15 minutes, and the car shows up. They will never have to own a car, until they get a wife, and kids, and have to take them 15 places.

But while they're single, yeah, there's going to be an impact, it's believed, on the ownership model. We don't know when, but they're starting to think that there could be.

COMMISSIONER SCOTT: Other questions around the table, for Dan?

All right. Thank you, Dan, for a wonderful presentation.

Back to Tim.

MR. OLSON: Okay, our next speaker is Philip Sheehy, from ICF. And he has some insights about utility infrastructure costs, and a whole range of things. So, we will --

COMMISSIONER SCOTT: So, Phil, we'll go about 2:25 to about 2:50 for presentation, and then sort of the discussion around the table. Welcome.

MR. SHEEHY: All right, thank you. Thank you, Commissioner Scott, for having me. Thanks, Tim, for reaching out.

I've got about 50 slides, so I'm going to go fast.

(Laughter)

MR. SHEEHY: No, that's not -- that's a good opening joke.

All right, so when -- when Tim reached out to talk about this, so I have two broad areas of work, that ICF is engaged in, that I want to talk about. And I'm going to cut to the chase, in the interest of time.

The main issue I was thinking about here, with

regard to how Publicly Owned Utilities can engage in the -- or incorporate transportation electrification into their integrated resource planning, was the conflict between the challenges of long-term planning and near-term market uncertainty.

Those are -- in this market, it's not that they're irreconcilable, but they're borderline. And so, I've outlined two different projects, or sets of projects that ICF is engaged in. One on the long-term side, and then one -- some of the near-term challenges, just to highlight the challenges that I see for Publicly Owned Utilities.

And the first one I'll review, work that ICF is engaged with, with the California Electric Transportation Coalition, in partnership with -- we've done some work with E3, and also with EPRI, on that. So, I'll talk about that. That kind of -- again, you know, I'll cut to the chase on that one.

That basically says that electric vehicles are great. That the infrastructure will pay for itself, so go get 'em.

So, I have more slides to prove all that, but I'm just going to cut to the chase there. So, that's the first part of the presentation that says, hey, EVs are awesome. And then the other one is notes from the

ground. So, ICF is also engaged in what are considered electric vehicle readiness projects where you -- some of them funded by the Energy Commission, where a sub to a local government or a county government, who are trying to figure out what the hell to do with electric vehicles.

And the answer isn't necessarily that electric vehicles aren't great. The answer is more electric vehicles are tricky to incorporate into municipal planning. So, and then we'll end with any questions you have.

So, that's the -- I'll start with the long term. Just real quick, this study is available, and you can go read it, it's great. I'll give a quick shout out to -- that's the Donald Trump answer to everything, it's going to be great. I've been using that in presentations left and right. I have to be honest, it's going to be great. You can get through a lot of slides by saying that, by the way.

(Laughter)

MR. SHEEHY: So, who's involved? ICF, E3, EPRI is engaged. I mentioned Kelly TC. So, the third bullet is actually the most important one here, to be frank. As much as I would like to p imp ICF upon you, really the fact that PG&E, SCE, SDG&E, SMUD, City of Palo Alto,

LADWP, and a couple of other CMUA members were engaged in this study, really gives it its value.

Again, ICF is great, E3's great, EPRI, we all do great work. But without their engagement, like the utility of the date -- or the utility of the findings just isn't there. No pun intended.

But, you know, really having that interface, that opportunity to get data from them, and do the detailed analysis, when we're able to, is more a reflection of utility engagement, than anything else.

So, I'll just talk about -- I just have three slides. Again, we give these three things and we ramble on for a long time, sometimes. So, I'm going to try and just do it in three or four slides.

Talked about market sizing, the cost and benefits, the grid impacts, and get through those.

So, we looked at, okay, let's push a bunch of EVs out and see what the impacts are, right, so that's this first slide. You don't have to memorize any of these. This is all available online.

So, we have three scenarios. In step one, and becoming a consultant, it's figure out three scenarios. That's a side -- that's a pro tip for you guys, out there. Figure out three scenarios to model. So, we have three that we looked at.

But there's more nuance than just picking three, guys, but I just am using that as an example.

So, we picked these three. Let's push these electric vehicles out on the road. and so, that's the market size. So, and what are the benefits associated with those?

So, there's some ancillary benefits, or co-benefits associated with this, before I get to the utility side, is GHG emi9ssion reductions and criteria pollutant emission reductions.

So, this is a handy chart. Just to show you that over there, on the far -- so, on the X axis, the horizontal is GHG emissions. And on the Y axis is criteria air pollutants, two things that we care about in California. And elsewhere, but, again, we're focused on or I'm focused on California and the Publicly Owned Utilities.

So, big GHG reductions for PEVs, over on the right there, you know, kind of middling criteria air pollutants. So, the other things up on the graph is just show that we looked at other market segments. So, there's 18 market segments, and we bundled them into these four here. The ports, medium duty, heavy duty electric vehicles, with some non-road, light duty electric vehicles and then rail.

And so, then, the number there, the gigawatt hours gives you an idea of an aggressive adoption scenario, associated with the load of those vehicles -- or of that electrification sector.

So, again, there's pages of -- to figure out how we got to these numbers, if you -- and you can talk to me afterwards, too, I've got more slides.

So, again, the benefits are there, right? So, that's the take home, the benefits are there. So, let's keep moving. This is my seeing eye chart graph. I put this together last night and I couldn't read it that well. So, I was like, they're not going to be able to read it, so I'm going to have to describe it.

So, I've got four corners here. So, what do you do? You take your electric vehicle forecast. You take your load shapes, how are the vehicles going to charge? And then, what rate are you going to put the people on? So, this is -- do I have a pointer? Nope, that's a pen. Does this work? Yep.

So, this is vehicle forecast. Again, you don't have to memorize these, there's no quizzes here. Where are the vehicles going to charge? What are the rates going to look like? And then, how much energy are you going to consume for each vehicle type?

So, we broke it out by plug-in hybrid electric

vehicles, in different ranges, and battery electric vehicles. So, you bundle all that information, and you push it out onto the grid, in California, and you determine the benefits. Right?

So, what are the key findings? So, you get your environmental and societal benefits, we talked about that. You get your GHG emissions, you get your criteria pollutant benefits. In all three scenarios. Right? So, you get this in all three adoption scenarios.

We're going to reduce rates for all consumers, and we pass all the cost effectiveness tests. So, you know, there's a parade going on this report here, right? So, you've got -- you know, we have estimates of the benefits to ratepayers, a couple grand on a per-vehicle basis. We find minimal distribution upgrade costs associated with this, with these scenarios. So, again, we pushed these out. And it's, actually, a pretty innovative methodology, where we tied vehicles to individual feeders, based on where we think they're going to go.

So, a lot of cool stuff going on in what are, otherwise, relatively simple charts. Right? So, the benefits are there. That's kind of what I want to -- you can memorize the numbers, if you'd like.

But the most -- for today's presentation, at

least, the idea is there is a benefit on a per-vehicle basis in all three scenarios that we modeled. Right? On a per-vehicle basis, you push out the infrastructure. Even, and if you can push people into different rate structures, and Nancy touched on this. And the benefits vary depending on where they're charging, and when they're charging, so we did a controlled charging scenario to demonstrate an increased -- that there is an increased benefit there.

So, again, the opportunity is there. Right? So, this, basically, presentation, or this report could be used to say, hey, Publicly Owned Utilities, you know, get in on this, go. So, I think that's -- and that's great. I think that's a good side of the equation.

So, the other one is, like, so, I've got this -- so, that kind of frames it long-term, right? So that, if you put Bill's questions on hold about autonomous vehicles, and wireless charging, and things like that, so those things, if you kind of put those aside for a minute and just believe that, in 2030, EVs are going to be great, right?

So, then, I'm going to switch gears to other projects that we're working on, which give me kind of -- not necessarily run counter to that long-term study, but kind of give you some insights.

And so, our -- here's where we're engaged, right, so these are not utility clients. So, these are, again, kind of what we consider readiness projects. So, recognizing that fueling in electric vehicle is different for the consumer, for local stakeholders, a variety of entities, the idea is that you -- through these engagements, you can help people become quote/unquote, ready.

So, this is a -- this slide serves two purposes. One, ICF is awesome and we're doing all these projects. And the other one is that, look, I'm not representing these people. But for this presentation the thing is like these people, or these clients are a little bit more like Publicly Owned Utilities. I would argue, then, the CAlETC project, right. So, that was mainly Investor Owned Utilities. Right? So, they have a -- and Dan mentioned that, they have a different type of capital they're working with.

So, not to say that municipalities that we're working with, on these projects, are the same. But they're a little bit more like a Publicly Owned Utility, than some of our other clients. Right?

So, these clients are counties, that work with local jurisdictions to figure out they're all going to get together, and make electric vehicles viable, or what

role the municipality can play. Right?

So, I think that, or at least from my perspective, I thought that this could help inform the discussion today, at least, or how Publicly Owned Utilities could engage in this space.

And, interestingly, so here, Tahoe-Truckee. Does that work? Tahoe-Truckee, one of the project partners in this is Truckee-Donner Public Utility District.

And then here, this Driving to Net Zero Grant is with the County of Santa Clara. And we're actually working with the City of Palo Alto, as one of the partners there.

Sonoma Shift Glen (phonetic), does have some engagement with Sonoma Clean Power. You know, they're neither a Publicly Owned Utility, nor an Investor Owned Facility. But just to say, you know, there's other things going on here. And, then just to say, you know, we've got things going on in other parts of the country, you know, Jersey and Pennsylvania. So, again, that's just the ICF is awesome part of my slide.

So, in the spirit of what Dan was talking about, you know, trying to figure out where the market is today, I think this is useful. It's like how are people charging their vehicles?

And I think it's a little bit trickier to answer where. But some people know where they're charging their vehicles. Like there are entities, like, you know, I'm guessing John, and some folks at Nissan know where those folks are charging their vehicles.

But, by and large, you know, like 70 to 80 percent of charging is happening at home, at this point in the market, like across the electric vehicle space.

So, I think it's useful to remember that, so, plug-in hybrids, so we heard a lot -- again, no offense to Nissan, but we heard a lot about battery electric vehicles. I just want to remind folks that there's plug-in hybrids, too.

I saw, Jamie, from GM, so I give them a shout out.

So, plug-in hybrids are being driven more or less like conventional vehicles, right? So, the blue line is how much electricity, the black line is gasoline.

But, like, in terms of mileage, how they're being driven, how people are driving them is pretty similar to a conventional vehicle, recognizing that people drive about 12,000 miles a year.

PHEV20, that's about a 33 percent, about their VMTs, about a third. And that's like your Ford CMAX

energy. That's what my wife drives. A little plug for the fam.

The PHEV40, it used to be a Volt, and then they upped the ante, and then the PHEV53, that doesn't work, Jamie, so we're going to have to stick with PHEV40.

So, but then you've got the BEVs where it's a little bit trickier, right? So, you've got this 100 -- I put 150, but 200 miles is probably fair where, you know, the 80 to 100 mile range vehicles are being driven less. And, you know, once you push above that 150 plus miles, the vehicles start to be driven a little more normally, if you will, or more like a conventional vehicle, if you will. Hopefully, that's not normal for too long.

But, so again, that's just to try and frame -- this is like one of the things that we talk about with local governments is just trying to understand, okay, how are these vehicles being driven?

So, when we talk about readiness planning, and I think this map probably isn't too different than what like an -- excuse me, what a Publicly Owned Utility might concern themselves with, is this readiness planning.

Again, near-term market issues is training, consumer awareness, what type of incentives are we going

to provide? How much do we understand about consumer behavior? Are we working with our local governments on this side of the world? Building codes, land use, permitting and inspection, are we working with them over there?

And, you know, like this is a good place to start. You know, I know this isn't necessarily part of a long-term integrated resource plan, but this is a good place for folks, looking to jump in, to -- or, for utilities looking to jump into this, on the public side, figure out, you know, where things are at in this area.

So, I've -- you can see this line is thicker than this line, on purpose. So, this initial batch of energy planning which, again, a lot of it is funded by the Energy Commission, and I think this stuff is very important.

And I should mention, there's a good study, from Idaho National Labs, that showed that when there's a planning process involved in the deployment of level two infrastructure, in Oregon, about 80 percent of the chargers were deployed in planned, quote/unquote, planned areas, and 20 percent were not.

And the utilization of the assets in the planned areas is up to 90 percent higher than an unplanned area. So, there's a basis, there's a reason for planning.

This isn't just, you know, let's go spend money type of exercise.

So, I would argue that, you know, the integrated resource plans, and the engagement on the Publicly Owned utility side, probably needs to shift a little bit away from this local government side of the picture, over here, and over to, you know, engaging with consumers.

So, I think this is where the utility opportunity is. At least when you do an IRP.

And then, again, you know, so these are the lines that decreased. And this is basically that these folks aren't necessarily going to take care of themselves, but there's other opportunities here.

So, again, there's been a lot of people, or a lot of ideas about, like, what are the challenges facing the market. So, in the near-term, though, the real question -- the questions that we see most are -- and in this, the PowerPoint version, it's got like a nice animation, and everything. So, this one, I'm just cutting to the chase, because I didn't know what type of PowerPoint you guys would have. So, just envision this with me, if you will, where I click a button and the vehicle type pops up, and it goes from left to right.

So, nobody really knows which way the market's

going to break, between -- so, on one side you have Bill's questions about, like, wireless charging, and autonomous vehicles. But right now, we don't know -- I mean, the market's pretty split between plug-in hybrids and battery electric vehicles. You've got promise of long-term -- or, excuse me, of longer-range, battery electric vehicles. But that doesn't necessarily mean it's going to cannibalize PHEV sales, right, that could still pick up. The market is almost dead split right now. It's like about 3 percent of the market, of sales, in the light-duty sector, in California, are electric vehicles, and it's about 50/50 PHEVs, BEVs.

And Nancy touched on this, the level of charging that you need in each one of these areas is different. She was talking about fuel cell vehicles and full battery electric vehicles, but I'm talking about plug-in hybrid and battery electric.

And then, you know, what the hell's your input on adoption? Is it -- you know, where do you sit in this? Like, how do you know how to engage in this space and how do you know what to incorporate into your integrated resource plan, if you don't know if you're going to get four cars or, how many do I have, 12. Right? So, I think that this is -- you know, this near-term market uncertainty, and then this -- and then, but,

you're hearing this long-term discussion about, look, the benefits are there, you just got to go get out there, and participate, it makes it hard for folks with, you know, different access to capital, to do that planning exercise.

And, you know, we see this at the local level, counties are trying to do their long-range transportation plans. Marco probably has a good feel for this. SCAG does. A regional transportation plan, out to 2035, and you're asking them to figure out how to incorporate electric vehicles into their sustainable community strategy. That's not that different of a question of, you know, Truckee-Donner Public Utility District, hey, figure out EVs, let's hope that they have all-wheel drive, that the crossover segment comes online, and that people up there are going to actually buy those vehicles, and not just be people passing through, right?

So, you know, and I think the other thing that, again, one thing that we, not necessarily preach, at least like talk about, I think there's an opportunity, and this is borne out in both our existing work, and in the CalETC work, this is kind of where I think there's an overlap between that long-term, near-term, is that, you know, it's not just about adoption. There is this

electrification of miles, and that doesn't necessarily have to mean PHEVs. It can also mean pushing BEVs into longer ranges, you know, and enabling 200-mile, 300-mile ranges, those vehicles.

So, you know, just pushing that market, rather than just adoption. Actually, pushing electric miles and actually competing with gasoline across the board, rather than just at home, or when it's convenient.

So, again, I don't necessarily -- I think I have more questions than answers, but that's kind of the -- at least, that's an overview of where we see things, and the challenge.

And I think that the term, like wait-and-see, like a wait-and-see approach, has some negative consequence -- not -- negative connotations. But I guess, from an integrated resource planning perspective, given the out year, and given the challenges of this market, an informed wait-and-see approach, that has some flexibility built into it, is warranted.

So, to the extent that that's feasible, or palatable, I think that's kind of some of the guidance, at least, that I would -- that we see in these -- the projects, or at least that come out of the projects that we see in the near-term, and the long-term, how to balance some of that stuff.

So, that's the -- I don't know how I did on time, but that's my last slide.

COMMISSIONER SCOTT: Great. Another informative and thought-provoking presentation.

I have a question for you, and then I'll look to see if our fellow Panelists do, as well.

So, you mentioned, back on kind of slides 7 and 8, when you were talking through the grid impacts, and the benefits that you found in the study for the IOUs, and you said, "The POUs can get in on this, there are benefits, go, get out there".

MR. SHEEHY: Right.

COMMISSIONER SCOTT: Do you see any differences, though, between the IOUs and the POUs, that you might -- that you might raise, or that might show as red flags between the study on the IOUs and having the POUs get out there?

MR. SHEEHY: Yeah, so we didn't distinguish between those assets, right. So, the study is based on information, like it's largely distribution infrastructure. So, we have information on distribution infrastructure assets from the project participants. So, there was information provided by -- so, we could distinguish between SMUD and PG&E, like what -- we didn't do that in the results. That was on purpose, so

we didn't -- or, by design. But you can't -- you could, conceivably, distinguish between the benefits in one service territory versus another, and it's a function of the vehicles that you can deploy, and the concentration, right?

So, getting back to the Truckee-Donner example, or Truckee -- the Truckee-Donner Public Utility District, we would, necessarily, anticipate the same number of vehicles there. So, it's not a linear relationship, but the benefits would -- are, you know, this benefit, here, is based on a per-vehicle basis across the State, averaged across all utilities. So, there's certainly variation there, right? So, we know there's variation. And it's less in areas where we expect lower adoption, I guess is -- so, that's the challenge that Publicly Owned Utilities face is, that have low potential for EV adoption.

COMMISSIONER SCOTT: Got it, thanks.

Anything from you, Kevin?

Okay, Jonathan, please?

MR. CHANGUS: Sure. Yeah, as a card-carrying member of the wait-and-see party, I appreciate those comments.

And, you know, this is an interesting study. I really like the readiness plan one --

MR. SHEEHY: Oh, yeah.

MR. CHANGUS: -- and the difference between the IOUs and the POUs.

MR. SHEEHY: I can go back to them, they're great.

MR. CHANGUS: Yeah. And I think that's an appropriate shift about working on consumer awareness and consumer behavior for some of the POUs, in which it's unclear how much is going to be there.

And I'll be honest, the concern is, especially about public charging, is how long is it going to take for sales to cover the cost of the asset? And it's unclear, in some places, what the usage case is going to be.

But the consumer awareness and consumer behavior, I feel like low-hanging fruit are a low risk activity that we can do to help build some interest, and get a better feel, and conduct some of the additional assessments, we need to, to figure out what makes sense, and where to plan it. So, I really liked the slide that is awesome, as you indicated.

MR. SHEEHY: Yeah, that -- I don't necessarily think that caution is a bad thing, you know, and especially given the uncertainty in the near-term. And I think that wait-and-see crowd isn't -- again, the

wait-and-see terminology can maybe -- can have a negative connotation. But I do think that there are -- it is warranted, in some places. And there are a lot of Investor Owned Utilities that, you know, Dan could probably speak to better, like nationally, that don't see that adoption, you know. So, they are in that wait-and-see mode. And I don't think that is a bad thing for them. They're just, you know, waiting. But it's informed, they're not just -- you know, they're not just throwing their hands up and saying, you know, I don't know what the hell to do. They're saying, you know, we're -- if you can try and figure out the metrics, or the analytics that would, you know, start to inform when you should engage, that's the other thing.

And I think, you know, engaging with consumers would start to -- would start to help develop that portfolio of metrics.

MR. CHANGUS: Yeah. I would think is not we're not doing anything, wait and see before you make significant CAPEX investments, and assets that may or may not pay for themselves before they're out of date, right?

MR. SHEEHY: Right.

MR. CHANGUS: We know technology's going to get better, we know battery ranges are going to improve. We

know that level two charging will have to be the standard, and maybe DC fast charging. So, before you make significant investments on that end, let's build some of the market and get some understanding of what makes the most sense for those individual communities.

And so, it is still very much being engaged in the electrification conversations, though not necessarily in significant CAPEX investments.

COMMISSIONER SCOTT: Amy, and then Marvin.

MS. MESROBIAN: Yeah, back on slide 8, I think it was, you were talking about the -- yeah -- that PEVs will reduce rates for all.

Can you just explain, a little bit, what some of the drivers are for that, that you found, specifically, in your study?

MR. SHEEHY: Well, it depends. I mean, the level of adoption. So, basically, you can -- if you can push it into a controlled charging situation, then you can manage the load better, and the utilities are able to push down rates. So, the investment is offset by increased revenue, right?

So, you know, so you have an investment, but the return on the investment than better than what you pay, so that can push down rates, basically.

That is largely through the controlled charging

scenario. I think it's a little bit -- Bill might be able to catch me on this, but it's a little bit - I think Dean's here, too. But I think it's a little bit tighter on the scenarios in which you're not able to push the charging around. I would have to double check, though.

COMMISSIONER SCOTT: Marvin, and then Kapil.

MR. MOON: Thank you, so much, for the presentation.

Are you aware -- well, let me back up. I've seen scenarios where workplace charging, in my opinion, is one of the biggest tools to increase adoption. Both, I've seen it at our facility, and some of our customers. They put it in, and pretty soon they have tons of cars.

Has there been any research, that you're aware of that, that can actually quantify the effect of workplace charging, and adoption, the chicken and the egg thing?

MR. SHEEHY: Yeah, I haven't seen anything. I think that's a fair -- so, you know, in full disclosure, you know, ICF helps manage the workplace charging challenge for the DOE and, you know, there is a lot of interest in that.

So, I totally agree with the concept. I don't know how -- like the structure of understanding how that

induces the demand, I don't -- I haven't seen anything. But, anecdotally, I've heard the same thing. So, I am equally bullish on that. But I haven't seen anything to say that, you know workplace charging equals adoption, and what that correlation is. But that's a -- I think that's something that folks are trying to understand. But I haven't seen anything, no.

COMMISSIONER SCOTT: Kapil? John, could you speak into the microphone, so folks can hear you?

Thank you.

MR. TILLMAN: I can say that we've actually had some projects where we've helped the employer incentivize the purchase of vehicles. And we -- once the incentive was there, we did see -- and we helped them install level two charges. Once you had both those in place, the adoption of vehicles on site doubled. So, we did see some significant increases.

COMMISSIONER SCOTT: Kapil?

MR. KULKARNI: So, of all the readiness plans you've completed, what are kind of the steps that these counties or authorities are taking after the fact, and are they at different stages of implementing that, those plans?

MR. SHEEHY: Oh, absolutely. So, you know, I mean, readiness planning is -- it's quite mundane, to

be frank.

You know, Tesla talked about the ludicrous mode, going from zero to 60 in 2.8 seconds. In readiness planning I talk about building codes, and permitting, and zoning ordinances, and prewiring, and, you know, I mean, Marco knows this stuff, too.

So, you know, it's definitely -- but, you know, you need to have planning staff, who can talk to planners, and then you need to know, like what permitters talk about, like the permitting staff talk about. So, they're definitely in different -- we try not to -- when you talk about the differences in where they're at with regard to readiness, that's a tricky question.

I'm kind of in favor, personally, taking off my ICF hat, I'm kind of in favor of shaming. But this actually worked in the PV market. I think it was Sierra Club, and I think they still publish this. It might be NRDC, though, but the publish the permitting costs of solar PV, statewide. I think it's Sierra Club, but I'm not 100 percent sure.

So, basically, there was this complaint, at the beginning of the solar PV market, that there was this variation across permitting, in permitting costs, and they just started publishing, and the gap has narrowed

considerably. Right?

So, in principle, a permit from a municipality, should reflect the cost -- I mean, they're not a profit-making entity, so it should reflect the cost of them to issue that permit, which is staff time. Largely, staff time.

And so, we do still see a variation in permitting costs, for no apparent reason. But we're -- our marching orders are no shaming. So, again, putting my ICF hat back on, no shaming.

So, there isn't an -- you know, somebody like Marco, would be in a better position to talk about this. But like at the regional level, there's some caution about telling municipalities, like where they're at, and what to do. There's some -- so, we don't live in a communist state, where we can do things from the top down.

And so, local plan use -- local land use planning, which is ultimately what charging infrastructure is, it's a land use issue, is all local governments. And they can tell you to, you know, to jump off a bridge at any given time, if you don't approach the issue delicately, when it comes to those local ordinances. You can only push so hard on readiness actions, and like until the locals are ready

to do it. And so, and often, that just takes a local champion or two. So, there's definitely variation. The follow-up varies by region.

I can't, I don't have any, like, tight bullets. But it doesn't always correlate with high demand. There are certain areas, like Emeryville, I mean, the City of Emeryville, in the Bay Area, like they have very aggressive readiness. I mean, they don't have a ton of vehicles, but they're extremely ready. And that's, in part, just because they had a handful of staff that were interested, and they have -- they were ahead on the building codes, they were ahead on permitting. They were one of the first people to require prewiring. This goes back to like ZEV 1.

And so, you know, there's kind of weird cases -- not weird, that sounds derogatory to Emeryville. But there's interesting cases, like that.

And then, there's other ones where they're not -- like, where there's a city that has quite high adoption, that you're going surprised at where they're at in regard to, quote/unquote, readiness.

COMMISSIONER SCOTT: Great. Well, thank you, very much, Philip.

MR. SHEEHY: You're welcome.

COMMISSIONER SCOTT: I will turn it back over to

Tim. And just as Marco and Tim are getting ready, we are at 2:50, so we'll go to about 3:15 for presentation and comments.

MR. OLSON: Okay. So, our next speaker is Marco Anderson. He's going to give us some insights on regional planning. He's with the Southern California Association of Governments.

And we're doing just a quick change out of his presentation, and then he can go into it.

And, I guess, maybe to remind people in the audience here, that we're coming up on the public comment, and there's a blue card, it looks like this, and if you don't mind filling that out, we can go in the order that we received them.

MR. ANDERSON: All right, thank you very much.

So, in the words of Monty Python, "Now, for something completely different".

So, I'm not really good at -- you know, you've seen a lot of data today, from -- you know, because energy is a very intensive data subject. I'm going to be showing you a little bit more pictures, and maps, and tell you a little -- some stories. A little bit more on the narrative focus of the barriers to implementing workplace, multi-family charging in Southern California, and some lessons learned.

And, I apologize to the Commissioner, because you have seen some of these slides. This is probably you're third time seeing them, because some of the pictures are from our 2012 Readiness Plan. And we are in the middle of a CEC grant to update them. But we don't have anything new to show on that front.

But we do have some of the initial stakeholder interviews that we've done.

So, let's see, here. So, some of you may be familiar with Southern California Region. SCAG is the metropolitan planning organization for a six-county region. All of Southern California, except for San Diego. They have their own MPO.

And one of the things that SCAG has, is at SCAG, we also administer the U.S. Department of Energy Clean Cities Coalition, which is a USDOE program to encourage the reduction of petroleum use. Particularly in the fleet segment, but starting with the introductions of hybrids and, especially, with EVs, has taken on a focus in the consumer market, as well.

So, this program at SCAG, along with our EV program, kind of is the cornerstone of what we do with alternative fuels. And we started getting into EV planning. We are not -- we really don't know our way around kind of the intricacies of energy.

But we were approached by Southern California Edison, in 2010, to engage in CEC and USDOE planning efforts. And what we bring to the table is understanding of transportation patterns and understanding land use.

And one of the things that I've personally been interested in, since about 2010, is that when we talk about planning, we talk about system planning, we talk a lot about kind of flows, and aggregates of energy consumption or, in our case, of traffic. We don't really engage, that much, with the individual unit.

And so, that whole conversation is changing a lot. We have Nissan here. We've been talking to OEMs quite a bit, especially with, it's been mentioned already, the introduction of automation, there's a much bigger convergence between kind of the car and the transportation system. And the car and the energy system. So, I think we're starting to see that take place.

So, our 2012 Electric Vehicle Readiness Plan, someone mentioned, when we were applying for subsequent grants, that are called kind of readiness planning efforts, and someone said, you know, the cars are here, they've been out for a little while. Are we not ready, yet?

And I think that's one of the challenges that we've heard today is there still is a huge need for incentives. This is not at a stage where these cars -- where the cars are kind of moving off the showroom floor without a significant amount of incentives, financial incentives, dealer training, consumer training.

And so, that's a problem that we face. Because we have the statewide targets and they're, in some sense, very aggressive. And we'll talk a little bit about that in terms of how that influences our regional planning.

So, the plan recommended some significant areas of focus, and I think everyone's talked about them. Primarily, our interest was in helping our local jurisdictions.

So, one of the things we heard, when we were doing sort of our round of presentations with the initial plan, one jurisdiction said, we're really supportive of this, just don't ask us to do anything.

And that's one of the challenges is there's no -- in Southern California, in particular, we're struck with there's multiple agencies, SCAG, South Coast Air Quality Management Districts, ARB, at the State level, counties, cities, and so all these different players are kind of in this role of promoting electrification.

There's no central entity.

The LAEDC was awarded a grant to fund something called the Advanced Transportation Center. They're filling a role, in talking to the industry side of things. So, their interest is in job creation, and in attracting industry along the production chain. They're still not the ones.

There's no one phone number that the consumer, in Southern California, can call and say, hey, I'm interested in an EV. They have to go to the dealer, they have to go to Southern California Edison. And all of these people play a certain role. But we're very challenged in that regard.

We attempted to apply for the recent USDOE Charge Everywhere Program, and we were rebuffed. And I kind of think that at the Federal level, as was mentioned earlier, California,, the rest of the country's like, you guys are -- we're not going to give you a bunch of money to solve this problem, because you guys are already there, compared to everywhere else. So, this is -- there's still a gap, there.

So, for our local jurisdictions we said, really, the focus should be on workplace charging and multi-family buildings. And we said, you should work with retail fast charging opportunities, as they become

available.

But as was mentioned earlier, there's not a business case for fast charging. And so, from -- not to say that that isn't vitally important, but that from the municipalities perspective, they could spend a lot of time chasing grants, and chasing opportunities, when there isn't -- you know, without a Nissan, or an EV GO stepping in and funding the thing, there isn't an ongoing sort of revenue stream.

So, when it comes to our Regional Transportation Plan, the Sustainable Community Strategies, as was referenced earlier, for those of those that don't speak acronym. That's what the MPOs have to do. Every four years we have to do a Regional Transportation Plan.

In California, we have to do an STS that, who's target is the reduction of GHG. And, primarily, that is linked to the reduction of VMP.

And this is an interesting thing. We talk a little bit about incentives. Sometimes it's challenging in an MPO, because it feels like our goals are not necessarily the real-world implementation of these things but, rather, the modeling.

So, we get very obsessed and focused on the GHG reduction, as it's modeled. Maybe not, necessarily as concentrated as we should on the actual impacts.

So, one of the things, for example, is that the statewide targets are so aggressive that there isn't, really, anything that an individual MPO can take credit for doing, in terms of promoting the number of EVs in our region.

So, not only do we -- not only would anything we do would basically meet the target but, in addition, it would be very difficult for us to demonstrate that one of our programs increased the number of EVs.

So, within our plan, we don't -- MPOs don't really take any credit or focus on the promotion of increasing the number of EVs. What we do is MTC developed something in the Bay Area, and they said, if we have a program to increase the number of charging stations, and we can link that to a plug-in hybrid, spending more time on their battery, and less on their gasoline, then we can take credit for that increment.

And I think that was a strategy that might have been fleshed out by ICF. And so, we said, that sounds great, we'll copy that. And so, they did that in their last plan. And we used that strategy. It was, also, further refined by the State Pollution Officers Association.

And so, that's it. So, when we talk about our EV infrastructure planning, that's it. That's the

little increment right there, the additional time of battery. And we say, whatever the State, whatever ARB says the efficiency of a PHEV is, add 10 percent to it, that's what we're going to do.

And so, we used MTC's number, and I'm glad to hear the technical term, the attachment rate. So, what we're aiming for is a five-to-one attachment rate of public charging. So, one charging station for every five vehicles. So, we take the statewide targets for EVs, in the SCAG region, and we say, what would it take to make that -- to have five stations per each vehicle, in general? And then, of those, we have -- that means we have so many PHEVs getting 10 percent more time on their battery.

Now, interestingly enough, we may have over-scoped this program, because one of the things that got lost in translation was ARB looks at this EV -- they get very wonky. It looks at EV equivalency. So, we were aiming for -- we, potentially, were aiming for way more charging stations, based on PHEVs. So, we're hashing that out.

But this is the program that's actually in our investment plan. But SCAG is not an implementing agency, though. So, this is not a real dollar figure. This just said, between 2020 and 2040, this money's in

our budget, it's been approved by our council. Somebody's going to spend this money and implement these programs. And so, we will be looking at programs, like LADWP's program, like the Charge Ready Program, and kind of claiming that as the money that's spent.

So, some of the other things that -- I want to make sure I touch on some other things. These are the additional slides, that aren't in the agenda.

Our goods movement focus, Southern California is more than, I believe the number is 40 percent of the goods for the entire nation come through the Ports of L.A. and Long Beach. And, in many instances, it's cheaper for things to be shipped from Asia, through L.A. and Long Beach, to New York, than it still is to go through the Panama Canal.

And so, one of the things we looked at was, not only that, but Southern California's a huge marketplace for goods and services. So, this chart, on the right there, is the warehousing and distribution facilities within Southern California.

And I can't remember the exact number. I think it's something like 60 to 70 percent -- or, 60 percent of these are within a, I believe it's 10-mile distance, from this east/west freight corridor.

Now, the bottom half of this is the 710,

Interstate 710. The top half of this is a State Route 60, and a route TBD, to be determined.

So, we are already piloting a catenary truck system, with Volvo, in Southern California. As was mentioned earlier, Southern California has Zero Emission Freight Collaborative. This picture's not Southern California, and you know that because of the strange, liquid substance, that's on the ground. So, I believe this is from Sweden.

But that pilot's already going along, with the catenary, and we're getting lessons learned from that. So, the hope is to implement something like that. But this is a very long-term solution.

One of the things that's happening very near term, is the implementation of electric transit vehicles. In our Clean Cities Coalition, we focus primarily on public transit fleets. And so, you'll see two different models here. You have BYD on the right, and Long Beach Transit, and Proterra on the left, with Foothill Transit.

Foothill Transit is an operator in L.A. County, that serves the eastern portions of the County. And they have two different bus systems in play. One is the Proterra model, which is a multiple recharge. So, this is a transit station. This line is, I believe, like a

12-mile long route, that kind of circulates, heavily.

and so, they start the day at a 100 percent charges, and they take six minutes, every pass, at the transit station to recharge, and at the end of the day, they have 85 percent.

The other model is kind of a heavy battery, that is able to go much longer distances, and cover longer distances. That's the BYD approach. And so, we're starting to see a lot of these be deployed.

Foothill Transit has a target to, I believe, be all electric by -- I'm going to mess up the year. I believe it's 2030. It might be sooner.

So, going back to kind of the readiness plan, you know, we did quite a bit of this readiness planning. And I would say the good news in Southern California, the initial impetus for this was exactly to gauge whether or not we had the same scenario as the PV situation in Southern California. Are there barriers to implementation? Are there really high surcharges? Are there very bureaucratic processes?

The good news was, if you own your own home, so the single-family home market, there really were no -- there really were no municipalities that had significant barriers. The costs were pretty reasonable across the board. There were some time considerations. But one of

the big fears was whether or not cities would require an on-site permit inspection process. We moved past that very quickly.

There's different levels of consumer friendliness that a city can engage in. And then, we had a number of recommendations in there.

There's, also, quite a bit of interest in kind of the zoning code. And, as has been mentioned today, building code regulations. But most of that is being addressed at the State level. CalGreen, most of our cities are adopting those, as their zoning comes up for adoption. But again, that's really focused on new construction.

And so, the new construction arena, I think, is pretty well managed. The single-family home situation is pretty well managed. But that does leave a huge market, as Nissan mentioned.

So, our plan and, again, these are pretty antiquated slides. This is all 2012 data, a lot of changes since then.

But what we did, was we were able to get vehicle registrations. We were able to look at that in relation -- so, here are the highest levels of single-family home concentration of vehicle owners.

So, we overlay that with kind of multi-family

housing. In other regions, they match up a lot closer. In this region, you can see there's a big disparity between where the concentration of 2012 EV homeowners were, and the single-family homes. So, we have a big income disparity in the South Bay.

One of the things we looked at was, using our transportation knowledge, we were able to model trips and say, where is the likely destination for work trips, of those PEV owners?

So, here, we get the concentration of where the people, who own the PEVs are likely to be going for work. And so, we have these peak morning destinations. We correlate that with large employers. And you can see, you know, one of the things done here is, again, there's -- we've provided tools to zero in the focus, but it's not the ultimate answer. Because one of the large concentration of employers is actually a refinery. So, that's probably not a huge number of employees. It's probably a large concentration of EVs going there, or potentially going there, because you have drivers, and it's an important destination for engineers, and white collar workers.

But to say that's a great place to focus on workplace charging, is probably not the case. But some of the other locations are. Torrance, for example.

So, then, what we looked at was midday destinations, and retail areas. And so, these were kind of areas where local jurisdictions could reach out to these shopping centers and say, you know, here's some information. You know, we're not going to be able to help you go get a grant, we're not going to be able to spend a lot of time with you, but here's -- zeroing in the focus.

And, again, this is widely out of date, 2012 charging station locations. So, here we were just looking at all three zones, and how they overlap with existing charging stations.

So, this is something we're looking to update. One of the challenges we have there is we -- you know, data is not cheaper. So, charge, plug share data is fairly expensive. Bulk registration data is also fairly expensive. And so, to add that to SCAG's annual budget for data acquisition is doable, but it's challenging. We went to go buy Polk data, and we're required to get multiple quotes for data, so we fund a cheaper version. Is it as robust, as it is easy to use? Not likely.

So, multi-family housing. So, CEC 14607 is our study that's currently ongoing. We chose to look at the Westside Cities area, and that's West L.A., and the cities that you see here, Beverly Hills, Santa Monica,

and Culver City.

And, obviously, there's a huge concentration of multi-family housing in those areas, very dense areas. Sixty-eight percent of the residents live in multi-family housing, over 200,000 units.

So, what we've started with and where we are right now, is redoing the analysis, redoing the siting factors. But what I can talk to you today about is kind of the stakeholder interviews that we've conducted.

So, we have a list, not of apartment buildings, but of workplaces. And so, we started reaching out to them to find out, well, what are the factors that were -- that induced you -- first of all, who do we talk to? And it's a combination of, if the building owner has a sustainability officer, or a parking manager, or a building manager. So, we had to find the right people.

So, I'll give you three case studies. One is Century City, those two large towers and the building across the street, 5,000 parking spaces, 100 percent occupied, tenant/employee parking. Initially, they started with 15 stations. Now, they're up to 25 level two stations. They, initially, had a mix of one and two, and the level ones were going unused. And they're potentially looking at 10 more.

This was part of a big project. One of the

things there, that you'll see with all three of these organizations, they organization, itself, has sustainability as one of their mission principles. And that is key. I've noticed that with this, I've noticed that with municipal transit fleets. If the city has sustainability as a focus, then the fleet managers are able to pursue alternative fuel vehicles.

And the same thing here, that is what completely enabled these building managers to even go out and start investigating this.

The second one is that building in the middle. It's actually a company that owns five properties on the west side. Four of the five properties have stations. In total, they have 15 Blink stations. Only one of the buildings, has one of the stalls with public access, but they don't advertise it. It just happens to be available.

And this was an instance where the building managers were receiving multiple requests from tenants, asking about charging stations. And we've found that to be the case in the past.

We tried, in the past, through different means, going out to workplaces, and it's just not on their radar. Until employees start asking about it, it's not a concern. And, usually, if it's any kind of an

informal parking arrangement, the first employee is able to, like, run an extension cord from the back of the building. And it's only the second or third employee that they start going out to charging stations.

Back up here, one of the interesting things was this building manager, and the parking manager, they were very engaged in the day-to-day management of the spaces. They had policies in place for rotating the vehicles out. One of the things they do, is you have to -- when you sign up to use the Coulomb systems, you have to sign an agreement. And the way they figured out to manage the parking was that, whether or not you're drawing electricity, you're paying for that spot.

So, there you go. You know, if you leave it there too long, you're going to get hit by a pretty hefty charge, and you're going to stop doing that.

And if you take the cord out, you will get a notice. And if you get a second notice, they'll send it to your employer. So, it's kind of going back to that sort of self-regulating system.

This building manager, on the other hand, does not really, actively, manage the electrical load. They don't really review the reports. You know, it was included as amenity, and as long as there isn't any problems, they don't really manage it at all.

And, lastly, there's a small property, a 164-room boutique hotel. Again, lead Gold rated building, sustainability-focused management. One level two station open to the public. And they approached NRG, the EVgo Program, to get it installed.

And one thing I did hear from an EVgo sales manager, was that the tipping -- he feels like they've reached the tipping point on workplace charging. So, for the past number of years, he's been out in the field, constantly being an educator salesman. And at this point, workplace sites are now coming to them and, saying, how do we get this installed?

When it comes to multi-family, again, they're far from it.

So, going back to some of the existing studies, the South Bay COG, which is our region, is completing their multi-family housing study, and that was this region right here. And one of the -- they have a number of findings. They've developed a really great methodology to look at the -- it all comes down to the parking structure and the parking layout, podium versus wraparound, all these different real estate terms. But that is really the number one driver.

They have found out about the type of typology you could apply, without getting into the building. And

they have had very limited success. It's very challenging. I wish I had better news, but multi-family is a real tough nut to crack. It's very difficult to even get to a contact person. The number on the door is rarely -- it could be a leasing manager, they have nothing to do with the building operations.

You're rarely able to get to, like, you know, the superintendent, or a building manager, on your first try. So, it's very resource-intensive to even get the minimal amount of data.

And we're even finding there, you know, the first few EV owners, they're not able to push to move the needle on getting those things installed.

So, what we think, it's going to take a few more years until, across the board, building owners are being approached by EV owners, who say, do you have charging? No. Okay, I'm sorry, I'm going to go check out something else. Until they hear that a few times and think, oh, I better to get this, to be able to retain those renters, then that will be the difference.

High end units, new, high end construction, in Southern California, is all opening with charging stations. It's an amenity, and so that's a different picture. But retrofitting older buildings is still very challenging. We're going to see -- it will be

interesting to see the results in the West Side, West Side Cities area.

So, that is -- that is my presentation.

COMMISSIONER SCOTT: Great. Thank you, very much, Marco. A very thorough and informative presentation.

COMMISSIONER SCOTT: I just had one, maybe thought or observation, which is, and the maybe I can turn that into a question. There is a lot of really good data and information here that you have. Some of which, I think, would be very useful to the POUs, as they're thinking about their integrated resources planning.

And so, I guess the question would be, you know, do you, as an MPO, work closely, or at all, with any of the POUs that are within your territory, to try and trade that type of data and information that might be useful to both?

MR. ANDERSON: We could probably be more robust about it. We do it very informally. I mean, obviously, Marvin and I know each other. We run into each other at these events. I have contacts at LADWP, in particular. You know, we encourage their programs, but in terms of the data sharing -- well, other than the fact that all of this is in our published plans, and is available,

we've never, like, sat down and said, you know, here's a data dump of what our view of the City of L.A. is.

COMMISSIONER SCOTT: Uh-hum.

MR. ANDERSON: We share that, you know, we integrate more closely with LADOT, for example. But, you know, with Burbank and Anaheim, is a very informal kind of relations.

COMMISSIONER SCOTT: Okay. I see Kapil, and then Philip. Oh, it's from last time.

Okay, Philip?

MR. SHEEHY: Breaker. So, on the multi-family, I'm just curious about -- having been engaged in some of the readiness projects, I think you were kind of hinting at it, about how difficult it is. It feels kind of like some of these projects are chasing something that doesn't exist, in my mind.

Like, there's this idea that there's a best practices for multi-family unit. And so, again, having been involved in the readiness plans, I think that even in parts of the plans that we've written, that talk about best practices, like if you really look at it, like it's more of like what's -- it's more like a status of what's happening, than it is a best practice, in my opinion.

And if you look at like the PEV Collaborative,

they have a handbook, I think, on multi-family. And it's -- it's not useless, but it's not that -- it's very, you know, pretty dry. Like, there's no way you can use that document to actually get multi-family infrastructure in place, in my opinion.

So, I'm just curious, like what -- is there -- I guess, are we obsessed with the solution for something? I guess, I mean, I'm just thinking, again, about the integrated resource planning. Like, if you have a lot of multi-family, is there a solution that, you know, that somebody's going to come upon to make it easier?

I guess I'm just trying to urge some caution, or push back against this idea that the multi-family problem, quote/unquote, is one that has "a" solution.

That doesn't seem -- I mean, I haven't seen anything, other than pretty generic bullets that re like, hey, you know, you got to go find somebody to talk to, and get some buy in. I mean, it sounds like that doesn't --

MR. ANDERSON: Yeah, yeah. No, I think the -- I think, so there's a few angles. You're kind of right, but I think we are getting close to some best practices in terms of taking a regional -- this idea of being able to finally define the parking situation, I mean, that's huge.

MR. SHEEHY: Yeah, that's -- yeah.

MR. ANDERSON: That's the huge one. So, that's a pretty innovative approach. So, if we could devise a system, where you can look at aerials, or you can look at kind of records, city records, and zero in on kind of the top ten priority of outreach, that's one best practice. That's been our holy grail. We tried to do it in 2012, didn't have the right data.

The other thing is, something that LADWP is doing, which is the rebate program. And so, putting rebates on the charging stations and treating multi-family, as a business site, I think is huge. And so, then, the question becomes, you know, how easy can you make that?

And the problem there is, again, is coming down to money. So, it's like you need the rebate for the charging station. You also need some sort of incentives from the State, still, because that landlord is just not going to do this for one penny.

MR. SHEEHY: Yeah, right.

MR. ANDERSON: You know, and so that becomes the challenge. I think that's getting to the point, are we talking about a situation where you have to subsidize the entire cost of the installation, and the charger, for the landlord to move the needle? Or, is there a way

to structure an incentive program so that the landlord can see a return on investment, even if they're having to like, you know, put some money in?

And that's the challenge.

COMMISSIONER SCOTT: Take a last question from Amy, and then we'll go on to our next presenter.

MS. MESROBIAN: Yeah, I just wanted to add to the multi-family discussion a little bit, because as I mentioned, the CPUC has been seeing some difficulties in our implementation, as well.

But I think, you know, like I'm overseeing one of the Southern California Edison Infrastructure Programs, and they've been having a difficult time getting into the multi-family sector.

It's not really a new problem. We've seen the same thing on the energy efficiency side for, you know, decades, as well. It's kind of a hard market to get into.

But I think there are innovative approaches. And I think Southern California Edison will continue to change their program, and their tactics a little bit, to try to get to that multi-family sector, as best as possible. And those are lessons learned, that I hope we can share with this group.

MR. ANDERSON: Yeah, and we're -- I mean, for

example, this study and the South Bay's, so we're hoping that these can sort of serve as screening tools. So that, I mean, it won't solve the problem, but it will kind of reduce the amount of manpower that Edison will have to go into, when they do their outreach.

COMMISSIONER SCOTT: Great. Thank you for a terrific presentation.

I'm going to turn it back over to Tim. And as Joel makes his way over to the podium, just again remind folks, if you'd like to make a comment, we've got those blue cards on the front table. Please be sure to pick one up, fill it out, and get it to Tim. That's how I'll know that you want to make a comment.

And, Joel, we'll go from about 3:20 to maybe 3:45, with your presentation and the discussion.

MR. OLSON: Okay, so Joel Espino is with -- legal counsel, with the Greenlining Institute. We're really pleased to have that insight on how to address disadvantaged communities, and lower income areas.

So, go ahead and use this.

MR. ESPINO: Great. Good afternoon, everyone. We're almost there, guys, don't worry, two more presentations to go.

I just want to thank Commissioner Scott, and Tim, for inviting me. It's been a busy week, or a busy

month, or a few weeks for me at the CEC. I think this is my third one in like four weeks, something like that.

So, but it's good to always be here, and bring the perspective that we bring.

So, again, my name is Joel Espino. I'm Legal Counsel for the Environmental Equity Team, at the Greenlining Institute. And, essentially, Greenlining is a made-up word. And it was made up as a response to redlining. If folks in the room are familiar with that concept, redlining, essentially, is a practice that -- it was predominant in the banking industry, where banks were, essentially, redlining communities, and not providing financial services to local communities, and predominantly communities of color.

So, Greenlining grew out of that need to be more proactive in terms of bringing investments into low income and communities of color. And so, that's where our name comes from, and that's what we do. We're a racial and economic justice nonprofit, and focus on economic empowerment of low income people, and people of color.

So, in terms of the agenda here, what we're going to talk -- what I'm going to talk about today is just, you know, what does equity in clean transportation mean? I'll give you a little bit of context around

that.

And then, talk to you about some projects that we've worked on in the past few years, in terms of EV equity, both on the EV incentive side of things, and also on the EV infrastructure side of things, with respect to the IOU pilots and things.

And then, I'll wrap up with some recommendations for investment and planning.

Before I get to the presentation, I kind of would just like to make some opening remarks, sometimes I like to do this, around just kind of rooting ourselves, in terms of where we are today.

And what I mean by that is that there's a lot of stuff happening, right, we're kind of like in this epic moment, in human history, in terms of transitions. We're becoming more and more diverse as a nation. We're seeing a lot of social issues that have been there, you know, forever, but starting to bubble up, again. You know, the Black Lives Matter movement is an example of that.

We're experiencing the greatest income inequality in history, right? And we're seeing how human activity is changing lifecycles and climate, right? So, there's a lot of stuff happening. There's great transition happening.

And so, to use my philosophy degree, for once, I'm going to use a philosophical question, right, which is, you know, we have to tackle whether this transition that we're in the middle of, if it's going to be just; right?

And so, what does that mean? So, moving forward is this transition from this dirty economy, dirty energy economy that we're in, and moving forward to a clean energy economy, is that going to be an equitable economy? Is it going to be an inclusive economy? Is it going to be a diverse economy?

So, these are the things that you're going to hear a lot through my presentation.

And I think the answer to those has to be, yes. We have to be able to leverage our public investments, and other investments to not only meet our climate goals, but also reduce poverty, if we can.

So, you know, it's easy to get caught up in the details, today. I hear a lot about kWs, and dollars, and GHGs. But, you know, let's take stock of the money, right. These are multi-million dollar investments that are happening with respect to EV infrastructure, and even EV incentives.

And so, you know, the question is, you know, there's great opportunity, today, to generate tremendous

economic opportunity for, you know, lots of communities. And so, how do we do that in our planning and investment, right? So, you know, not -- basically, not to lose sight of our larger societal goals that we have.

So, with that, I'll get us started real quick here. So, equity in clean transportation. At Greenlining, that means that it's a community-driven approach. You know, what that means is that we're being responsive to the transformation needs of specific communities, whether they're disadvantaged communities, low-income communities, communities of color, whatever terminology you want to use, but that they're community drive, right. Where that we're not just imposing a system onto them, but that it's actually response to their day-to-day lives, and so that's first and foremost.

Second, equity, and not equality. Show of hands, if folks know the difference, in the room? Cool. All right, we got some hands up.

So, an example that I -- that I'm going to share with you, just to kind of highlight this, because it's important to the work that Greenlining does, is Angela Glover Blackwell, who is the CEO of Policy Language, is a similar group as Greenlining, focused on racial equity and economic impairment.

An example that she used, recently, is kind of thinking of these two concepts as like in terms of buses, right. So, equality gives everyone the right to ride on a bus, in any seat that they choose. That's equality.

What equity means is that we have to ensure that there are effective bus lines in communities that need them most. Right, so it's about understanding that not all communities, not all people start at a level playing field. And so, essentially, it's a fairness concept, right. How do we focus our investment in planning to make sure that we're addressing those fairness principles in what we're doing?

So, the other things here, on the slide, are access to clean transportation options. And for us, that means, you know, looking beyond the early adopters, right, looking at untapped, critical markets that, you know, eventually, they're going to have to have EVs, too. If we're serious about these goals, right, everyone's going to need the EV.

So, let's not -- let's look at them, let's prioritize them, and let's not wait until, you know, it trickles down to them which is, you know, usually how folks talk about, you know, these technologies and early adopters.

And then, increase diversity in clean transportation economy. So, what that means is that, you know, I kind of alluded to this already, but jobs, right, business contracts. There's a lot of money at stake here, and how are we using that to diversity the clean transportation economy? How are we ensuring that, you know, communities of color, and particularly, low-income folks, who need jobs the most, are able to access job training programs, and jobs that are being generated through EV infrastructure or, you know EV maintenance, things like that. Manufacturing, that's big here, in California, too.

And then, on the business side of things, how are we making sure that we're procuring services and products form diverse, you know, business enterprises, minority-owned, women-owned businesses, right? How are we making sure that we're using these public dollars fairly, right, to do all of these things?

And then, lastly, how do we ensure that just, you know, government is representative of California's diversity, right. I mean, I'm sure you've all heard this, right, California's a majority minority state. So, the majority of folks, in California, are now, you know, considered people of color.

And so, what does that mean in terms of making

sure that decision makers, policy makers, are reflective of that. And, also, not just reflective in appearance, right, but also have those values of making sure that we're directing these investments in a fair way, right.

So, that is what equity in clean transportation means for Greenlining.

And, you know, folks have been talking about these targets that we need to be, in terms of EV adoption. And these exponential curves that I see everywhere, right? And to me, what that shows me is that, you know, we can't get there without, you know, people of color.

And so this chart here, basically shows that, you know, there's an exponential need, in terms of EV adoption, to meet our various climate goals. And the graph on the right there, shows just the demographics of how California, in particular, is changing.

And to me, what this says, is that consumers of color are the fastest growing consumer segment in California. And so, if we're talking about vehicle ownership, right, this is a very important demographic when we talk about, you know, the numbers that we need to get to all of this.

So, let me see what else I wanted to say about this point? So, when we're talking about solutions that

lead with equity, from Greenlining's perspective, what we're talking about is policy that improve public and environmental equality for low income communities and color -- communities of color.

What we're talking about is, again, increasing opportunities, economic opportunities, creating more jobs, or access to jobs being created.

And an example of this is SB 1275, which we -- whoops, that's the wrong button. Here we go. Which we helped pass back in 2014.

And what the target of California initiative is, you know, we worked with a coalition, and we currently do still work with that coalition on implementing this, this legislation. But, essentially, it has two goals. the first is to get to a million electric vehicles on California roads by 2023.

And second, increase EV access to low- and moderate-income consumers.

And so, essentially, what this legislation directed the California Air Resources Board to do, was to create a suite of what we call equity programs. So, I'm going to run through what these are and what they look like.

So, the first one there is scrap, replace vouchers for new and used EVs, also known as the EFMP

plus of folks, who are familiar with that terminology.

Currently, that program has been running for over a year, and it's been running in the South Coast Air Quality Management District, so Southern California, L.A. area. And it's been running in the San Joaquin Valley Pollution Control District. Something like that, I always get that one mixed up. It has to be different, for some reason.

So, it's been running there. And, you know, so far, you know, what the administrators have communicated is that there's demand. People want these cars, if you're giving them these vouchers.

So, an example, if you're a low-income person, you're living in a household of four people, and you're making -- that household is making &75,000, or less, you could qualify for a voucher of up to $9,500 for a new or used plug-in, a plug-in hybrid, or a pure battery electric.

So, especially when we start looking at the used EV market, right, that becomes like a crazy opportunity for a low-income family to be able to access a used EV. I saw that John, from Nissan left. But there's a lot of, you know, good, used Nissans that are coming off lease, that are for real cheap, 10 grant, 11 grand, right, they still have really good miles on them.

And so, how do we make sure that low-income folks can access that? And this is a great program for that.

We recently got a briefing from South Coast, on kind of how things are going there. They're program down there is called "Replace Your Ride", that's how they branded it. And what they've communicated is that they've issued out 980 vouchers so far. And that, around 43 percent of those have been for plug-in hybrid electric vehicles, and pure battery electrics.

So, you know, that's good, especially when you're considering, kind of two years' back, when we were passing this legislation, a lot of folks, particularly in the Central Valley, Legislators were saying, you know, you can't make eVs work in the Central Valley, you know.

And so, now, this is an example that it is working, right.

And just to kind of give you another data point, you know, the past three fiscal years, the Scrap and Replace Program has received around $12 million from the Greenhouse Gas Reduction Fund. And it's been budget shortfalls the past two years, right, because of the politics. I'm sure you're all familiar with what's happening with Cap and Trade.

But this year, you know, we got -- the Scrap and Replace Program bought a huge investment. You know, finally, Legislators rolled up their sleeves and said, this is really important, and allocated $60 million for Scrap or Replace vouchers.

So, that, to me, signals a great opportunity for POUs, IOUs, OEM'S, and all of the other acronyms, to make sure that we're leveraging these dollars, that are directed at low-income folks, to access cars. And let's -- you know, let's do something with that. Let's really maximize the impact and let's do it fast.

Some of the other programs here are supplemental rebates, for low-income folks to purchase, or lease new, electric vehicles. So, essentially, the Clean Vehicle Rebate Project.

What the Air resources Board did was increase the amount that a low-income person can get. So, that's what that is.

And then, there's also a low-income financing assistance program. There's currently only one pilot, and it's running in the Bay Area Counties. I forget how many counties it is, but throughout the Bay Area. And the administrator is a group, out of Richmond, called Community Housing Development Corporation. And they've only been running for two months, right now. And I

think -- so, the model is that they're providing low-income loans to low-income people who would otherwise get, you know, really, really bad loans, and really high interest rates, and it just wouldn't make any sense for them to take that outright.

So, they're providing low-interest loans, and also what they're calling a buy-down grant, so where they provide them a grant up front, to kind of make the financing work better, at the back end.

So, that's what they're doing. And these projects are going to scale up even more. The California Air Resources Board plans to do a statewide pilot of this, and is putting out solicitations, too, for an administrator for that. So, we're going to start seeing even more of these.

And then, lastly, electric car sharing projects in disadvantaged communities. And folks have already mentioned the one down in L.A. And there's one here, in Sacramento, too. And it's going to be at an affordable housing unit, where they'll be providing car sharing access to the residents there.

So, you know, the money's there. This year, you know, the Governor and the Legislature gave us a lot of money for these equity programs. And so, a lot of what we've seen, too, is that there's interest there, within

these communities, too. And so, I think that there's great opportunity to do more, and I'm just excited to kind of work with everyone else to try to make this happen.

So, in terms of Investor Owned Utility pilots, we've been involved in three applications, by Southern California Edison, San Diego Gas & Electric, and PG&E. And in terms of the equity provisions, right, the disadvantaged community provisions of this, what we're really excited about is that the Charge Ready Program, we secured a 10 percent minimum in disadvantaged communities. And so, what that's going to translate to is, essentially, around 150 charging stations located within, you know, the CalEnviroscreen definition of disadvantaged community, in the Southern California Edison territory.

And other things that were included, in terms of equity were, you know, a study on the consumer demand of EVs in disadvantaged communities, to help inform kind of a more significant scale up of this, in disadvantaged communities, for their second phase application.

And then, another thing that we were happy to get in there was a supplier diversity goal. Essentially, ensuring that they're contracting with diverse-owned businesses for, you know, their needs for

this pilot, as well.

The Power Your Drive Program, the San Diego Gas & Electric, the same thing, we got 10 percent minimum there, translating to 350 charging stations, because their pilot is longer term and has more, and similar supplier diversity goals.

The other thing that we got in there, too, was just kind of a nod, and ensuring that contractors, through this program are -- have hiring goals around, you know, hiring locally, hiring folks from disadvantages communities. So, you know, we got that in there, as well.

And then, lastly, we were part of the PG&E settlement, called Charge Smart and Save. And what we're really excited about the potential there is this pot for -- well, first, you know, we're securing more charging minimum requirements for the territory because it's, you know, obviously, it's a bigger territory than, SCE, and SDG&E, and then a lot more disadvantaged communities. So, we want to make sure that we got more there.

But, you know, there's a potential there for, you know, a pilot of EV equity programs, and providing funding for that. So, essentially, complementing programs, like Charge Ahead, to make sure that we're

further increasing access to low-income folks. And it could be like similar programs, right, like the financing, or some sort of, you know, car sharing type programs that this money could fund.

And then, lastly, this is the last slide, which is just some recommendations in terms of how to make EV infrastructure planning investment equitable.

Some things to look at are, access and affordability is big. So, like I mentioned, complementing and aligning with EV incentive efforts, like Charge Ahead, is really important for this.

Prioritizing funding and investments in low-income communities and disadvantaged communities. You know, creating a market signal and an inducement point for this, right? Because a lot of what we hear, in the infrastructure space, when we talk about low-income and disadvantaged communities, you know, alarms go off and everybody says stranded assets, stranded assets, right. And to us, you know, we call that redlining. And we don’t want that to happen, right. We want the opportunities to come.

And, you know, there’s these programs out there and it’s, you know, the chicken and the egg thing, right, a lot of what we hear from administrators is that folks, who are participating in these Scrap and Replace

Programs, for example, are not able to buy a Nissan LEAF, for example, because they don't have access to charging.

But if folks don't want to put charging in where they live, then they're never going to have access to charging. So, you kind of have to induce the demand there. And there's programs to support that demand right now, there's incentives for that. So, let's capitalize on that.

And then, one of the things, you know, I heard a lot about demand charges, and I think it's really important that if we're going down this route of electric vehicles, right, we got to make sure that it's going to be cheaper for a low-income person to charge on electricity, than gas, Or else, there's no point to put them in there because it's not going to -- it's not a benefit for them.

And then, I'll just quickly wrap up here, with these last two. You know, again, highlighting this idea of creating economic benefits, job training for low-income folks, purchasing goods and services from diverse-owned businesses.

And community engagement, right, ensuring that communities know about these programs, and what's happening, and that their -- you know, there's -- you

know, I know this is a lot resource intensive, a lot of the time, but doing your best to getting the word out and including communities in the planning that's happening, especially if it's going to be affecting, you know, where they live, work and play.

And then, lastly, trying different strategies to produce robust and diverse data. And I think that the IOU pilots is a perfect example of that. You know, we hear a lot about should we do a make-ready model? Should we do an IOU-owned model? I think we have to try all of them, and I think we should be as robust about those programs, as possible, to see what works.

And that's it for me. Yeah, thank you, and any questions.

COMMISSIONER SCOTT: Thank you. Yet, another great presentation.

I just -- it's not so much a question, but kind of a thought, but I'd have to formulate in a bit more detail, to really articulate well.

But I was thinking about what Marvin said, earlier in his presentation, how you worked with three other partners to kind of come together and try to solve a challenge of needing to get the infrastructure, having the land use go along with it.

And I'm thinking, in my head, whether there's a

way, with the planning, to pull together with the -- with the Scrap and Replace Program, and maybe there's a couple other key partners, that all come together, and we build something similar to the partnership that Marvin described earlier.

I feel like there's a lot of potential here that is unexplored, or maybe that we could -- where there's a lot more opportunity that we haven't had a chance to really dig into. So, that's more of a comment. That's not a question for you.

But let me see if Kapil has his -- that's up for this one, yes.

Oh, I'm sorry, let me start with Kevin.

MR. BARKER: Real quick, I'm going to try and formulate sort of a thought I've got on that, too. And this is more of a comment, than a question.

But thanks to our staff, and thanks, Joel, for coming here and giving this presentation. I was starting to worry that we weren't going to dive into this a little bit more, and I'm glad Commissioner Scott did bring up, in a question earlier today, the slice of multi-family versus single-family. Which I think there was also a comment that people asked, well, how do you charge your vehicle. And it was, well, I know how to charge my i-Phone. Well, you don't have that option. I

can charge my i-Phone in my multi-family unit. But I don't have necessarily, an option of charging a vehicle.

And so, I think that's pretty key to really try and figure out ways of targeting that sector.

Then, looking at sort of the global SB 350, and I was going to kind of save these comments to the very end, but I think if it's here, the Energy Commission, working with the ARB, are looking at, you know, barriers, and then also solutions for, not just the transportation. I know we're talking transportation here, and that's what our sister agency's really working at. But energy efficiency and renewables.

And so, I think it's pretty important, and I'm glad you brought up, and you mentioned a number of times the equity issue. And I kind of don't see, and this is maybe, just more kind of thinking out loud, but measuring success of SB 350, when it really does have that focus on the barriers report, isn't just sort of that 50 percent renewable, or that doubling of energy efficiency. If we don't really find a way of cracking the sort of equity or multi- -- or, excuse me, the low-income, diverse communities aspect then, I don't know, did we succeed or not?

And so, it's just kind of a comment that we're working hard on our report. And I see Michael back

there. We've got all our Commissioners involved. And so, again, I think we really need to focus on that piece. So, thank you for being here on that.

COMMISSIONER SCOTT: Okay, we'll go to Kapil, and then Bill.

MR. KULKARNI: Thanks for your presentation, and I liked the intro, where you set the stage for why we're here, and that there is life going on, outside this room, as well.

And I had a comment about -- that I made earlier, about how, you know, Palo Alto has three times as many EVs as Burbank, mainly because they have a higher household income. And so, kind of making a case that the State, and other parties, whether it's manufacturers and dealers, need to provide more incentives.

And I wanted to know if you have any data on whether a supplemental incentive to low-income households has had an impact on the number of EVs being purchased and leased?

MR. ESPINO: No. No, that's actually a really good question and it's one we're definitely trying to get a handle on, in terms of just having more access to this data, and how it's having an impact.

It's just, you know, a few things are -- you

know, a lot of these administrators are under-resourced, right. I mean, it's hard for them to produce this level of data.

And second, you know, we're trying to work with the administrators, and the Air Resources Board, to kind of do more periodic assessments of these impacts. So, no, but we're working on it.

COMMISSIONER SCOTT: Bill?

MR. BOYCE: I'm just going to make two comments, really. I know in Sacramento, on the Share Car Project, one of the big benefits is one of the partners is Sacramento Housing and Redevelopment Agency. And what they really come to the part with is property. And this is the whole thing about having property owners that want to put this in. You know, and they're a property owner that isn't, necessarily, looking for some sort of guaranteed ROI, like, let's say, a retail strip mall.

So, you know, one of these places where you get -- you know, the limitation is getting property and a property owner that really wants to do things. That's, you know, one of the hardest nuts for us to crack, and that's one of the big benefits I see on that.

The other one I didn't see on your charts, I think is in Southern California Edison's, one of their plans, too, is really looking -- starting to look at

more vehicle incentives in that for used vehicles. And, you know, having different, you know, incentives farther down the chain, which we haven't done here, but other states have done that. And that's been another way, when vehicles come off lease, and they're really cheap, how do you, you know, just sweeten the pot a little bit more at that level. So, you know, I know some of those plans are inexistence. I don't think we've really executed them, yet. But it will be interesting to see how effective those are, getting them into the disadvantaged communities.

COMMISSIONER SCOTT: Any other -- any other thoughts from around the table?:

All right, thank you very much, Joel.

We will now go to our very last presenter, to wrap us up and bring us home, today. It's about 3:50, Jim, so I'll give you until about 4:15 for your presentation, and for comments.

And I'll let Tim introduce you.

Tim Olson: Right here. So, we're pleased to have -- go ahead -- we're pleased to have Jim Hawley, who's a representative of a fairly new association of EVSE companies. And it's the California -- it's the Electric Vehicle Charging Association.

MR. HAWLEY: Thank you, Tim, and thank you,

Commissioner Scott. Let me just see if I can -- okay, yeah, here we are.

We appreciate, very much, the opportunity to comment and provide input on your planning for vehicle electrification.

As Tim mentioned, the Electric Vehicle Charging Association is the State level trade association devoted to focusing on representing companies that manufacture, install, and service electric vehicle charging equipment.

Our focus is, in the first year, has been California. Many of our members are headquartered or heavily located in California. By our count, we account for the majority of the installations that have occurred.

And I would say a few things, briefly, about our industry. First, this is an industry characterized by a lot of significant innovation. We are innovating, not only in terms of technologies, but also new business models.

For example, networking technologies that support remote station diagnosis, repair, and upgrades, fast charging along key corridors, free charging, inductive, or plug-less, or wireless charging. You know, and new technologies, like master controllers,

that allow site owners to charge more vehicles, with less infrastructure.

And I would also say that our industry is characterized by rapid growth. These are U.S. Department of Energy numbers. These are the number of workplace, and public charging stations in California, as reported to the DOE. And I caveat by saying they're not complete. Not everybody reports to DOE.

But you can see very significant growth, and almost a tenfold increase from 2011 to day. The annual growth rate here has been between 30 and 50 percent.

From last September to this month, the growth rate was actually over 40 percent. And if you extrapolate this rate, it would be something like 220,000 charging ports by 2025. And that's not to say that we're going to get there all with what we've got. We know we have a lot of investment coming from the IOUs, from the POUs, from VW. There's a lot coming in.

But I think it's indicative of the fact that the companies that are out there now, doing the installations, and the work, and the manufacturing, have given us -- and, really, put California in a leadership position.

And I would also say that EV charging represents a significant economic opportunity. As we reported last

year, in the State of the Charge, we anticipate that the direct EV charging industry employment will double in coming years, and that we will account for about $4 billion in sales, and service revenues.

We have a -- to guide the actual integrated resource planning, EVCA supports a number of high level principles to guide all investments, not just those of the public utilities.

First of all, we are very interested in collaboration. If we're going to reach 1.5 million zero emission vehicles and, ultimately, electrify California's entire fleet, we're going to need every investment dollar that we can find.

And we also support innovation, competition, technology-neutral strategies, and customer choice as key ways of improving the electric vehicle charging experience for consumers, and making it widespread, and lowering expensive costs. And we support minimizing regulatory barriers and sustainable financing.

And in this regard, EVCA members are very interested in working with public utilities, in California. We believe that the public sector and the private sector have complementary strengths. EVCA members bring, to the table, capital and expertise. And although the POUs typically have more limited capital,

compared to the Investor Owned Utilities, they are creative and resourceful partners.

So, we have a number of specific recommendations for what we consider to be a successful partnership. First is, the POUs do believe that we should develop -- or, we do believe that POUs should develop goals calibrated to support achievement of the Governor's Zero Emission Vehicle Goals.

I think Bill made a very good point that, in some cases, you need to look at the expected uptake of EVs in your particular service territory. But, basically, we think that that's generally a good paradigm to start with.

The second point is customer choice is critical. And I would call out, here, LADWP, which is providing a strong example of how to help consumers make informed choices. Their website, I think, is an example of how to help residents understand the market offerings in a competitively neutral manner, to obtain rebates, to understand the available electricity rate structure that are available.

And more fundamentally, I would say, the public utility incentives should support customer choice, both for level two and DCFC charging. We support rebates that help finance stations, and we also support EV make

ready infrastructure, under which the utility provides the utility side electrical wiring, panels and conduit.

Marvin, I think, talked about a provision of conduit. I think it was a great step forward.

And I would say that, in order to fund all of this, I think, you know, we would certainly be interested in working to ensure that Cap and Trade auction revenues are available to support these investments.

A lot of that money has gone into direct EV incentives. None of it, I don’t think, has really gone into EV charging incentives.

So, I would applaud LADWP for really pioneering an especially effective rebate program. As, I think, Marvin mentioned, a $500 rebate for the residential side, $4,000 rebates on the commercial side. That’s enough to make a significant dent in the costs and move us forward.

Our key point is this, a rebate process, in which the EV charging companies compete for the customer’s business, has proven to be a very successful model. A rebate approach requires that the site host bring private capital to the equation. And it also requires hosts to think, carefully, about where they locate the equipment, and how they will maximize the

station use.

And I should point out that this Commission uses a competitive process to provide the AB 118 funds, and we consider that approach to have also been very successful, deploying stations for about one-third of the cost, to taxpayers, as some of the models where -- the more expensive models, where the utility proposes to own and operate the stations.

Further, maybe some best practices on rebate programs. First of all, we think the terms of the rebate should be flexible. And LADWP, for example, allows either the owner, or the operator, to be eligible for the rebate. We think this promotes rapid deployment and innovation.

Second, I think the charging solutions should be future proofed. In other words, think about the challenges that we face ahead of us. For example, the need to consider station reliability, network solutions, for example, enable the remote monitoring of station performance. They facilitate maintenance, and they also allow for prompt repair.

Another issue, obviously, is the demand on the rid. We talked quite a bit about that, today. Renewable solutions, that don’t tax the grid, are attractive. And I think network solutions that

facilitate both demand response, and vehicle-to-grid strategies, to harness energy stored in EVs, are also quite attractive.

Third, we think that it's good policy for rebate recipients to provide a minimum service level, for a period of time, as a condition of a rebate, to ensure a station reliability.

EVCO's service provider members all offer maintenance and service warranties to ensure a positive experience for a driver. We think it's important to plan for maintenance.

And, fourth, we agree that it's important to invest in under-served areas. We look forward to working with POUs to assure service -- service to disadvantaged communities, and multi-unit dwellings.

I would say, we don't support a utility-ownership model. But where one has been proposed, we think that most of those efforts, and such an expensive approach, should be focused on sort of the parts of the market that have not been as well served.

The next point -- oh, I think I missed one. New service interconnections. This has been a -- these are very important to expeditious deployments. We've had some slow interconnection times with the Investor Owned Utilities. EVSPs, our members have often waited as long

as three to six months for a quote, and then maybe another three to six months for a service draw-up or upgrade. But, in some cases the waits can be even longer.

And I think this is a particular problem where the company owns and operates the equipment, in competition with the private sector. Then, you have the dynamic that, essentially, a competitor has control over someone's -- the competitor's timing, in terms of when they can open a station.

The last couple points. Tariff reform, very important to spurring fast charging. In the long run, the public utilities are going to sell a lot more electricity. I think that was pointed out that it can help put downward pressure on rates.

But with current EV market volumes, public DC fast charging stations consume relatively small amounts of electricity, but they experience large demand spikes.

So, on today's standard, medium, commercial rates, the results of high demand charges can be responsible for up to 90 percent of a station's utility bill.

EVgo, one of our members, recently analyzed its utility bills, in 90 sites, in California. The average all-in cost was 36 cents per kilowatt hour, almost twice

that of the residential electricity costs. And we heard, earlier, that Burbank was charging 51 cents.

And also, remarkably, depending on the location's tariff structure, the average cost of this electricity varied by a factor of 300 percent. So, some places are even more expensive than that.

The problem -- the tariff -- varying and expensive tariff structures are a major barrier in making public EV charging affordable.

I think, you can imagine the difficulty of building out a State network, if parts of your area -- parts of the areas where you're trying to serve have very, very expensive rates.

So, I think, we, at EVCA, and its members, are interested in working with the utilities, across the State, to develop and pilot rates that match the evolving usage and demand profiles of public fast charging.

The last point I want to make is about carbon credits. EVCA supports efforts by Government, and the private sector, to unlock innovative carbon credits that can support EV charging investments and maintenance.

These include the Low Carbon Fuel Standard in Oregon and California. But, also, private sector efforts, such as the EV Charging Credit Coalition's

voluntary carbon credit methodology.

So, there's a lot of talk about the use of LCFS credits. These re recurring, they're variable based on the use. And they're important to enable -- I think they are, actually, a really good revenue stream that's calibrated to help maintain the stations.

So, our point is, it's important to maintain the stations and important to have a revenue stream for the site host, to make sure that the stations continue to be reliable.

So, I think we're interested in working with the utilities to ensure that that revenue stream's available for that purpose, as well.

And that concludes my presentation, Commissioner Scott. Thank you for the opportunity. We look forward to working with your, our friends in the utility world, and other stakeholders, to make electric vehicle charging the vehicles of choice.

COMMISSIONER SCOTT: Thank you, very much, for, yet, another wonderful and informative presentation. It's just been a fantastic day.

I don't have questions for you. Let me see if any of our friends around the table here, and fellow Panelists have questions for you, or whether Kevin.

Go ahead, Amy.

MS. MESROBIAN: Just one quick one. Can you just, briefly, explain the EV Charging Credit Coalition you were mentioning at the end?

MR. HAWLEY: It's basically --

COMMISSIONER SCOTT: Go back to the mic, so the folks on WebEx can hear you, please?

MR. HAWLEY: I'm sorry. Yeah, I'm not that familiar with it, but I think, essentially, the idea is that they are pulling together the resources from companies that want to fund -- that, you know, want to be green, that want to, basically, say that they're carbon neutral.

They're paying in, and the idea is that it pulls together those revenues and becomes an additional revenue source. So, I'd be happy to talk with you further, offline.

COMMISSIONER SCOTT: Anyone else?

MR. HAWLEY: Questions?

COMMISSIONER SCOTT: Okay, thank you so very much, Jim.

I want to turn, now, to Kevin, to see whether or not he has any closing remarks, and then I might make some, and then we'll turn to public comment.

MR. BARKER: Real, real quick, thank you. So, first, I'd like to thank Commissioner Scott for pulling

this together, and thank staff for everything.

And also, thank you for letting such a newby, in the transportation world, sit up her with you, so I appreciate that.

I think I'll be real quick and just say, you know, ultimately, we've really got to keep the eye on the prize, and 40 percent reduction of greenhouse gas emissions, statewide, is really important to meet that by 2030. And we won't be able to do that without the transportation sector.

So, and I think, you know, government is -- and I'm glad the Municipals were here to talk about the stuff they're doing with, you know, police vehicles, and such.

And, we know, we've been working with our Federal folks on trying to help them. And so, you know, I think it's important, also, that us, as a State, lead by example to really try and help get infrastructure in our workstations, our buildings. And then, try and help deploy EV vehicles throughout our fleet, as well.

So, thank you very much.

COMMISSIONER SCOTT: Great. Thank you very much for being here, today.

I will just, also, underscore the importance of planning for transportation electrification as part of

the, you know, Publicly Owned Utility Integrated Resource Planning. It just can't be understated. I think that there's a lot to look at and consider. And I will highlight a non-exclusive list of things that I heard today, in no particular order, that, you know, kind of struck me. I heard it either more than once from someone, or very definitively from someone, are things that will need be considered as the Energy Commission's thinking about what that planning should look like, and as the POUs are thinking about what that planning should look like.

And that was, so, the time-of-use rates, and the importance of those in getting people to charge, when we want them to charge.

Characteristics of the load, that Nancy Ryan, and others, meant.

That's there's going to be more fast charging online, and that fast charging is going to get even faster, and how do we take that into consideration.

The strong need for equity in any solution that we put in place.

Again, the multiple-family buildings and workplace charging continue to be critically important, but also continue to be challenging. So, I think we need to put on our thinking caps, and really see whether

we can find some interesting solutions, or opportunities, in that space.

The more electric vehicles you have, the better the benefits are of the infrastructure. And that's kind of to the overall grid, and we heard that from several folks.

We heard about the importance of the Low Carbon Fuel Standard in helping to support getting the infrastructure out there, but also giving incentives to customers, up front.

And a question that I had was whether or not there are places where group buys, or bulk purchases, or coordinated planning across the POUs, or as Amy, from the CPUC mentioned, where POUs and IOUs are close together, and you might have a corridor, or something like that, that goes through both territories, is there some joint planning there, that might really help facilitate this.

So, that's just a few things that jumped out at me, amongst lots. I feel like my brain is chock full of really excellent information.

And so, I want to say thank you so much to our presenters for coming today, spending time with us, really giving us great information to think about.

And then, participating with each other in a

dialogue, and asking questions. I really appreciate your engaged participation.

And I also just want to say thank you so much to Tim, for putting all of this together. He did a fantastic job on the agenda, terrific set of speakers, and we couldn't have done that without Tim's fantastic organizational skills. So, thank you, Tim.

I'm now going to turn to public comments. I have two people from EVgo, so I'm not quite sure who wants to come and speak. But it's I have Claire Dooley and Jonah Edus. And we're going to have three minutes per group. So, please, let's see, probably the best place to go is up near Tim, the mic that he's got there. You guys can stand together.

MS. DOOLEY: Okay, I'm just going to take this one. So, first, of course, thank you, Commissioner Scott, thank you, Tim, for putting on today's fantastic workshop.

I'm going to echo, a lot, of, I think, what Jim very eloquently crafted, just in this last presentation, but I'm representing EVgo.

Our core mission is to provide reliable and affordable EV charging that instills range confidence, and enables all drivers in California, and across the nation, to go electric, including those who live in

apartments.

And we are very encouraged by what we heard today, about all utilities planning to electrify transportation. And we would like to urge all utilities, to incorporate into their planning, elements of tariff reform.

So, as Jim told you, right now we are on medium commercial tariffs. What that means is our demand, which is around 100 kilowatts, is a fixed cost, regardless of how much electricity is being delivered at our EV charging stations.

Right now, in California, it's about 150 kilowatt hours per day. So, pretty low electricity rates, pretty high demand charges.

We know that EV charging infrastructure is essential in increasing EV adoption rates, but we also know that EV adoptions rates, as they increase, they will make our business more viable.

So, again, we encourage you to work with us to make these demand charges more manageable, so that we can continue to deploy and operate these essential charging stations.

The point I want to make sure I address, because I heard it more than once, is that there's not business case for the EV infrastructure industry. And I just

want to stand up here and guarantee all you that myself, my colleagues at EVgo, my colleagues across the EVSP industry, we're working very hard to turn that around. We strongly believe that tariff reform is one part of the solution.

We also believe that LCFS credits are an important part of the solution, and something that we also look to, to help us continue building, maintaining, and operating these stations.

I want to elaborate, a little bit, on the EV Carbon Charging Coalition that was mentioned earlier. It is a voluntary credit pilot program that we are currently working on, in collaboration with partners, such as GM, Audi, the Carbon Neutral Cities Alliance, Siemens, and the Connecticut Green Bank. And we think this is a further way to unlock value in the greenhouse gas reductions of EV charging infrastructure.

I heard LCFS credits come up many, many times today. So, it is evident to me, as well as others in this room, that they are part of the solution.

So, really quickly, to summarize my parts, I think that tariff reform and carbon credit markets are essential in the EV charging industry. And we look forward to working with all utilities on their planning process for transportation electrification. Thank you.

COMMISSIONER SCOTT: Thank you, very much.

Our next person is Lisa McGhee, from San Diego Airport Parking Company. And she'll be followed by Anne Smart.

MS. MCGHEE: Okay. Thank you. My input is, first, I just think you guys did a fabulous job as it relates to the grid information. And it's obvious that the POUs are highly ambitious, so I appreciated that.

The commercial integration planning for EVs is black and white to light duty. The commercial EV vehicle miles traveled is 125 to 200 per day, not 40. I'm doing 20,000 miles per month in my vehicles.

And I have, for Amy, what is the integration plan for commercial? This should be a goal, in what type of percentage is going to be integrated for commercial.

Some of the data for planning commercial is missing. The commercial EV charging stations are 13 kilowatts, to upwards of 300 kilowatts. Plugging in at a specific time is not possible for commercial, without fast charging, due to the vehicle miles traveled and the range limitations.

I'm addressing the technology of fast charging, as something that is the complex issue. I didn't hear a lot of that, today. It's not single-phase, it's three-

phase. It's not 120 to 240 volts, it's 480 volts.

That is something that is an issue when it comes to property. It becomes an issue when it comes to vehicle technology and EVSE technology. It all has to be compatible in order for you to get the output of power for 480 volts fast charging.

We need to have partners with the OEMs. There needs to be more information related to the vehicle technology and the future of fast charging.

Evaluating our progress with fast technology, the volume and numbers of EVs will increase the kilowatt usage. So, more revenue opportunities will exist, due to high utilization.

So, how we support deployment for fast charging, and how we save, compared to fossil fuel cost. At 30 cents and 50 cents per kilowatt, that's 50 percent to 70 percent more than my diesel, at $2.60, 22 miles per gallon is 12 cents per cost, per mile.

The short haul and duty cycle, as that what it would be for my diesel vehicles. The future procurement for commercial charging fleets, it does require demand, kilowatt delivery, MUD and workplace charging simultaneously, will also create demand, though residential price plans don't have demand fees.

And so, how can you plan to solve the issue to

save in fast charging, with more volume of charging and more loads.

Decarbonizing, use of off-grid charging, and a solar infrastructure, battery storage, some of that integration needs to be part of this planning.

Also, it saves on kilowatt usage costs, and it supports the carbon score.

Infrastructure, funding, and rebate is needed for some type of infrastructure for fast charging. The awareness of the characteristic loads, I'm going to try to go through them before I get cut off here. The vehicle technology, the architecture, has it got battery packs, battery charging. It's got infrastructure three-phase, or fast charging, and all that equates to what the technology can actually do. It's got to be compatible with the EVSE equipment. It's got to be compatible to your property transformer, and the range affects what you're going to actually be able to achieve, with that type of vehicle duty driving.

And then, what is your route? Is it hilly? Is their weather going to be cold? All that limits your range. Those things have to be thought out. And what is your connection, SAE, Combo, CHAdeMO, J-1772 and all those things.

And then what is your tariff rate, so just want

to kind of end with this.

Your tariff rates is a critical part of this. The IOUs are at $13 to $23 per kilowatt. The POUs, I found to see, $2.75 to $10 per kilowatt. So, we need a rate design for EV commercial use to support a benefit for owning EVs. Thank you.

COMMISSIONER SCOTT: Thank you.

I have Anne Smart, followed by Colin Santulli.

MS. SMART: Thank you, Commissioner, for holding this workshop. Thanks, Tim, for organizing.

As an industry, I know one of the points of the workshop was for the utilities to be able share best practices. But, from an industry position, it's really helpful for us to see where the markets are going, and have the clarity, in looking into next year, to figure out where the incentives may be available, and what markets we're looking at. So, we appreciate all of that.

ChargePoint is the largest network of EV charging stations. We have a business model, very similar to Uber, in that we do not own our charging stations. We provide the network services and we sell the stations to independent, private, property owners, who then operate the stations, and charge the fee of their choice to EV drivers.

We're really excited to work with all the utilities here. I think it's important to point out that ChargePoint, and may of our competitors, have been in this industry for a very long time. We've been around for eight years. We have tested out various business models. We believe we are successful, now.

But we also are here to offer our thoughts on, you know, multi-family solutions that may work, and ones that haven't. On our experience with grant programs that were not successful, and utility programs that maybe didn't work, versus ones we felt were successful in really helping the industry.

We've said our peace, before, about LADWP setting up a really helpful program. Many of you know that we have also supported SDG&E and SCE, in their own programs. We look forward to working with you, to develop more.

I think many of our points were said. Just two brief things. One, we do believe that there needs to be some look at tariff design. For two issues, one, design charger form is an issue around the State, and makes it difficult to sell a DC Fast Charger, when we tell the property owner how expensive it's going to be to operate that station.

And, furthermore, once we've sold it, it's

difficult to convince that operator to keep that station online because of demand charges.

Secondly, we know that there's a need to look at the grid and figure out what the impact will be of the EV load, and to work with EV drivers, to ensure that they're charging at appropriate times of day.

However, we also want to make sure that people actually get an EV, and that they aren't nervous about whether or not they're going to be charged too much, if they charge at the wrong time of day.

So, I think that there are many opportunities to provide rate signals to the site host, encourage certain driver behavior. There's opportunities for managed charging and load management through the site host.

And we encourage each of the POUs, here, to think through whether or not there is a structure that we can implement, that supports EV drivers, but also supports the site host and their ability to operate that station.

And I will leave it at that. We are a resource, if you need us. We're headquartered in Campbell. We're happy to show you any of our stations. Thanks.

COMMISSIONER SCOTT: Thank you.

I have Colin Santulli, next, followed by Tom Ashley.

MR. SANTULLI: All right. Thanks, Commissioner Scott. And for those of you guys, in this thinned out crowd, who don't know me, I'm Colin Santulli. I'm the Director of Transportation at the California Center for Sustainable Energy. We're a nonprofit headquartered down in San Diego, with offices in Oakland, and Boston, and Los Angeles.

And I'm going to make two very different comments. The first one is related to multi-unit dwelling installations.

Like Marco and Philip, we also work with CEC-funded readiness planning, both in San Diego, and in the San Joaquin Valley, in the public agencies in those regions.

And I think, what we've seen there, is not dissimilar to what we've seen here and the challenges of multi-unit dwelling installations. And it's not really surprising and it's not all that new.

The staff member, or my colleague, who heads up our infrastructure work, spent the last eight years working in the industry, with ECOtality, first, and ten next with Energy EVgo. And both in projects that were publicly funded, to really try to push infrastructure into the market.

And both have seen -- well, the EV project had a

lot of challenges, and I think the settlement through -- that NRG's working with, is a little behind schedule. They're trying to meet their targets.

But my point being, is even with free stations, or free equipment, and highly subsidized installation costs, there's still challenges to the MUD puzzle. And so, I think, to a certain extent, Philip really was spot on, in his comments, that there may not be a best practice. There might not be solution. It may just be a question of some really patient hand-holding for those site holders -- or, those potential site hosts for the MUDs.

And we've seen that. When we proposed -- what we're doing right now, in San Diego, and in the Silicon Valley, are no-cost technical assistance, which is through the Energy Commission, and we've seen that be very successful.

And it's not uncommon in other industries, it's paid for through consulting firms, and it could be just in this industry it's too early, and it needs to be -- the actual hand-holding, through the installation process, needs to be subsidized from the public sector.

So, for the municipalities that -- I know that just means more staff time for you, but that would be the recommendation that I would give.

And the last comment I would make was to Kapil's question about the influence of the increased incentive for low- to moderate-income consumers, a very different conversation. We also administer the statewide incentive, the vehicle incentive. And with that, we have a survey, we've added questions to that survey, specific to people who have received the increased incentive. We're asking a suite of questions about how that increased incented affected their decision-making process. And that will -- we'll have results on that (inaudible) -- thank you.

COMMISSIONER SCOTT: Great. Thank you, very much.

I have Tom Ashley, followed by Hannah Goldsmith.

MR. ASHLEY: Well, thank you, Commissioner. Thank you, Tim. Really, just want to thank everyone for coming and making this possible today. I thought it was an excellent conversation.

Kevin, we really appreciate your engagement, as early on as you may be in this process.

But we saw a lot of amazing presentations today, and I thought it was a really diverse conversation. You know, on one end we have Nancy Ryan, and Philip. On the other end we have Joel, and maybe Marco, and everything in between. It was just fantastic.

I just want to identify, for those of you who don't know me, I'm Tom Ashley, Senior Director of Government Affairs and Public Policy for Greenlots. And for those of you who may not know Greenlots, we're a leading provider of EV charging technology and services.

I just want to identify, for the Commission's benefit, that we are not a member of the EV Charging Association. And while, generally, across this industry, there's more agreement than disagreement, there are some philosophical differences, and I just want to identify that fact. And that there are a number of principles that Jim mentioned, that Greenlots does not support. Thanks.

COMMISSIONER SCOTT: Thank you.

I have -- do I have Hannah in the room, still? Oh, there you are. Hanna Goldsmith, followed by Ryan Schuchard.

MS. GOLDSMITH: Hi, Hannah Goldsmith, from the California Electric Transportation Coalition. We're a nonprofit trade association, comprised of utilities, light, medium, and heavy duty manufacturers of electric vehicles, and others that are supportive of transportation electrification.

Thank you, so much, for putting on this wonderful workshop, today. It was very enlightening,

and it's very ambitious -- or, it's really helpful to see everything that the POUs are doing at once.

And we're really excited about everything that the POUs are doing. It's nice to see the different, creative ways that they're investing in infrastructure, as well as education and outreach, and other rebate programs.

To just kind of reemphasize what a few people said, that public, private, and State funding for electric vehicle charging, and for all of these other programs, is extremely necessary.

And looking at the NREL report, as well as the CEC report for the gap in the electric vehicle charging infrastructure, there's a huge gap there, that is not going to be filled by all of these programs, in addition to the VW settlement.

And we'd just like to emphasize that, for the CPUC, SB 350 proceedings, we're a little bit concerned that the speed at which the IOUs are going to be able to move forward with their applications, and they're new, proposed projects, will be a little too slow for the gap in infrastructure that's needed.

And so, we'd like to encourage the CPUC to take a couple notes from the POU projects, and the success, and ensure that everybody is moving forward at the speed

that's needed. So, thank you very much.

COMMISSIONER SCOTT: Thank you.

I have Ryan. I see he's on his way up. Followed by David Siao. If I'm -- I hope I'm pronouncing that correctly.

MR. SCHUCHARD: Thanks, Commissioner Scott, and Tim, for a great day. Ryan Schuchard, with CalSTART. I'm also a hopeful rider for the 440 train, but I may be looking for a ride back to Oakland, if someone's got one.

Also, I'm with the Commercial Electric Vehicle Working Group, a project at CalSTART, that Marvin mentioned before. We have seven fleets, including transit and others, a couple of IOUs and other technology providers.

And I just want to endorse two things. Commissioner, you already endorsed these, but I think they're really important. I hard workplace charging is really important in the number -- well, support is needed for workplace charging in a number of different ways, in addition to what the IOUs will probably be able to support. And so, Energy Commission's role with financial support, and other support, for this sector is going to be very important.

Second, I've heard, as I often do, a number of

references to the Low Carbon Fuel Standard, the importance of the LCFS in financing. But as many know here, in the room, we had to roll up our sleeves this summer, to develop political support, keep the support going or the standard, and the work's not over, yet.

So, particularly the POUs, the Energy Commissions, and others here, who can play a positive role in extending the influence of the LCFS is going to be especially important this year, and the coming couple of years, if we're going to continue to be counting on it. And, hopefully, we'll not only do that, but it will increase the value that it provides to the sector.

And then, finally, I just wanted to mention that I thought this was a really good discussion on light duty, in particular, today. But there's really a lot we need to do with medium and heavy duty commercial electrification. It's a sector with different issues, in many cases. It's one that's more heterogeneous than light duty, and it's something that maybe deserves its own sister session. CalSTART would love to be involved with that, help get that going, do whatever we can to make it happen. Transit and Last Mile, might be places to start with that.

Thanks again, very much.

COMMISSIONER SCOTT: Thank you. Good luck

making your train.

Do I have David Siao, in the room?

MR. SIAO: So, thank you, Commissioner Scott. For those of you not familiar with Roseville Electric, we're a mid-sized utility, right next to Sacramento. And for those of you who may not have heard of me, David Siao, I've worked at the Energy Commission, and the PUC as well, before. So, it's really exciting to come back and see everything that we're working on right now.

Thank you, Commissioner Scott, for organizing this very excellent and informative workshop. And thank you, to the presenters who still remain, and the ones who left, for their very informative presentations.

I just had two questions. One of the presenters and one more for the Commission.

The first one, for the presenters, the POUs, specifically. A lot of you mentioned that you have some LCFS revenue. And I was wondering, is that through your residential customers, through your fleet, or through other means?

And for the Commission, my question was, I've heard that there may be some coordination or cooperation with ARB, in terms of quantifying and verifying the shift in GHG emissions from the transportation sector, to the electricity sector.

And I was just sort of wondering what the current status of that was. Whether that's still in the sort of preliminary phases, or if there's been a sort of decision on where the responsibilities, and where the resources are going to be. Thank you.

COMMISSIONER SCOTT: Thank you. I will note that the Energy Commission, the PUC, and the AIR, are working very closely together on that, and many other topics within this realm to make sure that our work is coordinated. And that, to the extent that we can, we're using similar baselines and things like that.

So, I will not put my POU friends on the spot, but maybe if they're still here, and would like to circle around with you, when we're done with public comment, they are more than welcome to.

Thank you, so much, for your comments.

Next, I have a written comment from Sue Hall, who is -- I don't have any more cards from people in the room. Let me just make sure there's no one else in the room, who wanted to make a comment.

Jamie Hall, go ahead. Kyle, I'm going to ask you to wait. Since you're a CEC staff, maybe you can talk to some folks offline, if you don't mind.

Go ahead, Jamie.

MR. HALL: I'll make this extremely fast,

because it's late, and because I missed a lot of the day, unfortunately. But, Jamie Hall, from GM. I just wanted to say thank you for putting this on, and thank you to the POUs that you're doing. We think the utilities have an incredibly important board, in moving transportation electrification forward.

I came in, in the middle of John Tillman's presentation, and just want to echo a few things he said on workplace charging. It is important. We do think that it sells cars.

And, two, the idea of urban clusters of DC fast charging is something that we, also, are looking a lot at, especially as we move towards vehicles like the Bolt EV. And we think it's also, potentially, a solution worth investigating, for getting around the whole MUD problem. And, certainly, we may find that it's easier to put in a few plazas, than trying to get to a whole lot of landlords. But I think we need to keep pushing on all fronts, and need more charging, and faster action across the board.

So, thank you. And we look forward to work with you on this.

COMMISSIONER SCOTT: Thank you. And, belatedly, I will hand the blue cards to our Court Reporter. But if you have a business card that you would please hand

to our Court Reporter, he would very much appreciate that. That will make sure that your name is spelled correctly, on the record. He's right here on the corner.

So, I don't have anyone else in the room. I do have a written comments, which we will be sure to get into the docket. It's from Sue Hall.

We will open up the line. Sue, if you have something, in addition, to say, that would be great. If it's just a repeat of what you have written, we can read it. We've got it in the docket, so I don't need you to read that. But if you've got something additional you'd like to say, please go ahead.

Hold on, we're unmuting the lines.

MS. HALL: Thank you. Can you hear me okay?

COMMISSIONER SCOTT: Yes. Please, go ahead.

MS. HALL: Terrific. Well, Commissioner, many thanks to you, and to Tim for convening this workshop today. I'm Sue Hall, CEO, with Climate Neutral Business Network. And we recently created and convened the new EV Charging Carbon Coalition.

Just a quick recognition that a lot of our discussions today have focused on the importance of accessing new sources of capital and new incentives to accelerate EV charging.

And I think the questions that many of the utilities, Marvin from LADWP, and others have raised, regarding the ways in which the greenhouse allowances on the Cap and Trade are allocated between the utility and transportation sectors are really important.

And, there are often very creative solutions, beyond the 4-to-1 allowance allocation that Marvin mentioned, that are being pioneered in Washington State, for example, under its Clean Air Rule, that would give both utilities, and other EV infrastructure investors, access to the carbon capital that their investments deliver, including the fuel-based reductions. By creating carbon credit projects domestically within the State, here, say, within California.

So, this is a particularly innovative solution. It's one that has been used, actually, with renewables, when the set-asides were created, both in California Cap and Trade, and REGIS (phonetic). And, you can avoid double counting for such credits, for EV charging, by providing them access to the set-aside provisions.

So, you know, as a market-based solution, this provides the kind of capital incentives that would provide those utilities, and their partners, that are putting capital on the line, to deliver this expansion in EV charging with the right kinds of incentives.

And, with the EVCCC, we've been developing new methodologies for the carbon (inaudible) markets to build carbon credits and bring then online, that could be applicable, in a California context, to enable you to be able to approach these same kind of solutions, to address your greenhouse accounting questions between the transportation and utility sectors.

So, we very much welcome a further discussion on some of these broader and creative approaches, if that's something that folks would be interested to pursue. And, you can certainly reach out to our EVCCC members, GM, Audi, EVgo, and others, or reach me, sue@climateneutral.com. If you're interested to explore this further, we'd very much welcome the discussion.

COMMISSIONER SCOTT: Great. Thank you very much.

Our next comment is Mehdi Ganji, also on the WebEx. Go ahead, you're on.

MR. GANJI: Hi, my name is Mehdi Ganji. I am with Willdan Energy Solutions. For those of you who may not be familiar with our firm, we are a consulting company in California, based in Anaheim, and I'm in charge of the advanced new technology.

One of the topics that we need to focus, in order to increase the numbers of EV integration into our

market, in California, is to help the owners to participate in the V2G's (phonetic) technology -- I mean, the business model. We need to improve the business model and how we help the EV's owners to be willing to participate into V2G. Because, based on the previous research that have been done already, the owners are not willing to do that because they are kind of worried about the cost of the battery replacement, and the concern that they have for getting the battery, needs to be replaced, if they participate in V2G.

At the same time, one of the things that help the California State to increase the number of the EVs, on the road, is to consider the commuters. We already have rate design for the residential and commercial entities, but we haven't considered anything for the people who use the EVs for commuting, and using public transportation in California State.

So, we have the numbers of the people who use the public transportation, and don't drive a lot every day, and they have their car sitting the parking lot of the public transportation, without being used.

Those are the good sets for being used as a storage unit, and it can be considered in IRP planning for different type of utilities, including the Publicly Owned Utilities and Investor Owned Utilities.

And the same time, we need to come up with some more opportunities for those people, who would like to do a project related to second life of the batteries, of these vehicles, in a way that we can provide more incentives, and financing help to the owners of the EV.

Thanks, a lot, Commissioner, for arranging this meeting.

COMMISSIONER SCOTT: Thank you.

The last comment I have, from the WebEx, is Les Graham. And they're unmuting your line, so please go ahead.

Oh, okay, Les Graham is no longer on the line. I will read the remark that I got, which was a question for Dan Bowermaster.

"Is there publicly available information on the utilization of the EV charging stations, particularly in California, to know where supply and demand is?"

So, that's just another comment that we had from the WebEx, earlier.

Any last -- any other comments on the WebEx, before we -- okay.

All right. Well, thank you, very much, everyone for a terrific day. I will underline, or underscore here, you can see up on our screen, public comment. Please submit your comments to the docket. You've got

the -- comments are due by 5:00 p.m., on November 1st. You have the link right there, and we look forward to hearing from everyone in writing.

And thank you very much for your participation today, we really appreciate it. We are adjourned.

(Thereupon, the Workshop was adjourned at 4:38 p.m.)

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REPORTER'S CERTIFICATE

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

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

IN WITNESS WHEREOF, I have hereunto set my hand this 27th day of October, 2016.

PETER PETTY
CER**D-493
Notary Public

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

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

IN WITNESS WHEREOF, I have hereunto set my hand this 27th day of October, 2016.

Myra Severtson
Certified Transcriber
AAERT No. CET**D-852