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BEFORE THE

CALIFORNIA ENERGY COMMISSION

In the Matter of: ) Docket No. 17-IEPR-07
Report (2017 IEPR) ) Planning

IEPR Commissioner Workshop on
Integrated Resource Plans
Light Duty Vehicle Sector

CALIFORNIA ENERGY COMMISSION
HEARING ROOM A, 1516 NINTH STREET
ART ROSENFIELD HEARING ROOM
SACRAMENTO, CALIFORNIA

TUESDAY, APRIL 18, 2017
10:01 A.M.

 Reported by:
 Peter Petty
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Janea A. Scott, Commissioner, Transportation

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CPUC
Commissioners Present
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Alejandro Zamorano, Bloomberg

Public Comment
1. Steve Taber, eMotorWerks
2. Samveg Saxena, Lawrence Berkeley National Laboratory
3. McKinley Addy, ADTRA
INDEX

Introduction and Overview
  Ms. Heather Raitt  4
  - Purpose of the Workshop
  - Expected structure for the day
  - Brief overview and background on past activities
  - Public comments and stakeholder interaction

Opening Remarks
  Chair Robert B. Weisenmiller - CEC  5
  Commissioner Janea A. Scott - CEC  6
  Carla Peterman - California Public Utilities Commission  9

Policy Context and Overview of SB 350 IRP Requirements
  Energy Commission Role - Mike Sokol  10

Draft Transportation Electrification Guidance for Publicly Owned Utilities (POUs)
  Noel Crisostomo, Moderator Energy Commission  39

Scenarios for Future Penetration of ZEVs
  Alejandro Zamorano, Bloomberg  54
  Derek Jones, Navigant Energy Practice  74

Planning and Interconnecting Loans from High Power Charging
  Noel Crisostomo, Moderator, Energy Commission  96

POUs' Responses to Draft Transportation Electrification Guidance for POUs
  Noel Crisostomo, Moderator, Energy Commission  127

Local Government, Automaker, and Customer Perspective
  Noel Crisostomo, Moderator, Energy Commission  185

Closing Remarks  230
Public Comments  237
Adjournment  253
Reporter's Certificate  254
Transcriber's Certificate  255
MS. RAITT: Welcome to the workshop on Publicly Owned Utility Integrated Resource Plans, Transportation, Electrification, the Light Duty Vehicle Sector. I'm Heather Raitt. I'm the Program Manager for the IEPR. I'll quickly go over housekeeping items.

If there's an emergency and we need to evacuate the building, please follow the Staff to Roosevelt Park, which is diagonal to the building. Today's Workshop is being broadcast through our WebEx Conferencing System and parties should be aware that you're being recorded.

We'll post an audio recording on the Energy Commission's website in a few days and a written transcript in about a month. We're very fortunate to have a number of speakers today, and I'd like to thank you all for making time to be here.

And since we do have a very full Agenda we will be providing reminders about timing, hoping not to be too disruptive, but we'll let you have a two-minute warning and let you know when time's up. There will be an opportunity for public comments at the end of the day.
And you could fill out a blue card if you'd like to make public comments, and we'll also be taking comments from WebEx at the end of the day. So you can use the tap function to tell our coordinator that you'd like to make comments.

Meeting materials are all at the table and posted on our website. Written comments are due, and because of tight timing of everything, they're due a little earlier than normal, on April 28th, and the notice provides information on how to submit comments.

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

CHAIRMAN WEISENMILLER: Good morning. I'd like to welcome everyone here. Like to thank Commissioner Peterman for coming back home.

COMMISSIONER PETERMAN: Thank you.

CHAIRMAN WEISENMILLER: And basically, I think we've all made the point that it's really all about greenhouse gas emissions, and when you think about California's greenhouse gas emissions you have to think transportation.

And certainly, it's not only greenhouse gas emissions, but certainly, air quality. If you look at the South Coast and San Joaquin, transportation's
a huge part of the issues there. I mean, certainly, the recent studies on asthma rates for people who live within 500 feet of the freeways are pretty scary.

And at the same time, it's also about jobs. You know, 20 to 30 percent, though we'll get more as we get into the heavy duty next time, but certainly, 20 to 30 percent of the economy in Southern California is goods movement.

So these are very important topics as we try to really electrify our transportation sector, and it's very hard. I mean, we have about, you know, in terms of looking at California, you know, we're 40 percent of the applicable electric vehicles in the U.S., but it's still just a teeny fraction of our vehicles in California. So anyway, looking forward to today's conversation.

COMMISSIONER SCOTT: Well, good morning, everyone. Let me start by welcoming y'all to the Energy Commission today to discuss the Transportation Electrification Section of the Publicly Owned Utilities Integrated Resource Plans.

And I'd like to say a special welcome to Commissioner Peterman. Thanks for much for joining us here today. We're glad to have you. The purpose
of today's Workshop is to bring together a diverse set of stakeholder perspectives on electrification of the transportation sector to help inform what type of quantitative and qualitative information may be useful for inclusion in the Integrated Resource Plans.

Just to recap, Senate Bill 350 requires that the POUs adopt Integrated Resource Plans by January 1st of 2019, and asked the Energy Commission to review those plans to insure consistency with provisions of the law, including that IRPs must address procurement of Transportation Electrification.

The language addressing procurement of Transportation Electrification provides flexibility in terms of how the IRPs discuss this emerging market, and the Energy Commission would like to work with the publicly owned utilities and other stakeholders to identify what data and information should be included in this section.

To start the discussion we have put forward a set of ideas for Draft Guidance, but it's our hope that today's discussion provides the Energy Commission and our POU colleagues feedback on how best to frame this section of the IRPs.
Our goal is to ultimately provide guidance that incorporates aspects of today's dialogue, reflects the diversity of the state's publicly owned utilities, coordinates with existing POU reporting requirements, and to the extent possible, encourages consistency across utility plans.

I want to emphasize that our intent is for today's Workshop to be the beginning of a collaborative partnership, or a continuation, really, of the collaborative partnership that we have with California's POUs.

So for in order, as the Chair just mentioned, in order for us to meet the state's greenhouse gas goals, cleaning up our transportation sector is a critical component. So coordination and collaboration between the state, local governments and utilities is imperative in order to plan for a robust charging infrastructure that can support increased penetrations of zero emission vehicles.

Transportation Electrification provides both a challenge and an opportunity for California's publicly owned utilities, and we look forward to working with y'all and the stakeholders to help push this market forward. So thanks, everyone, for being here today. I'm very much looking forward to our
discussions.

COMMISSIONER PETERMAN: Good morning, everyone. Thank you, Commissioner Scott and Chair Weisenmiller for including the Public Utilities Commission in today's Workshop. This is a critically important Workshop, as Chair Weisenmiller has noted. Electrifying the transportation sector will be key for meeting our greenhouse gas initiatives. And I've appreciated the Energy Commission's leadership in zero emission vehicles over the years with the R&D programs, implementation of AB 8.

And the PUC appreciates having that knowledge, the knowledge about the technologies and where vehicles are going to inform our work in this area. As you noted, the statute has responsibilities for the Energy Commission and the Public Utilities Commission in overseeing the implementation of the transportation portions of SB 350.

And I'm proud to say that this is an area where we collaborate extremely well. The agencies have met over the years to talk about how to coordinate our investments and we're doing the same here.

And finally, I'll just pick up on a word that Commissioner Scott said regarding having
stakeholders here to inform us. What's so exciting about this space is that this is first in its kind what we're trying to do here. And so your comments truly matter.

We are figuring this out in real time. Both of us have a very active stakeholder process and we take your comments to heart. So be thoughtful about what you write. We might actually do it. And we're looking forward to working with you in the days to come. Thank you.

MS. RAITT: Thank you. So we first have a series of presentations to provide Policy Context and Overview of the SB 350 IRP requirements, starting with Michael Sokol from the Energy Commission.

MR. SOKOL: All right. Good morning. I'm Mike Sokol with the Energy Commission. I'm Special Coordinator for implementation of SB 350, and today I'm just going to provide a brief overview of the Guidelines for publicly owned utility Integrated Resource Plans.

So SB 350 gives the Energy Commission some responsibilities to -- in relation to the publicly owned utility Integrated Resource Plans, and here's just a brief list here that summarizes what those responsibilities are.
Essentially, we are tasked with reviewing the IRPs once they have been developed and adopted by the POU governing boards, and also plan updates, which essentially will be a full Integrated Resource Plan.

We are required to provide recommendations to correct any deficiencies in regards to the requirements of SB 350, and we are also working to develop with the hopes of adopting guidelines to govern the submission of information needed to support the Energy Commission's review of those IRPs.

So this just is a snapshot. I think everyone's familiar at this point, but these are the POUs that meet the threshold of having to file IRPs with the Energy Commission. And you'll notice here that there's 16 on this list.

It's possible that that list will change over time for the future updates as things evolve, but just to get a snapshot of the number that we're looking at. So this really gets into more of the meat of the presentation, which is, you know, what are the requirements of the POU IRPs, and this is from SB 350.

So first and foremost, to meet the greenhouse gas emission reduction targets for 2030
that will be established by ARB in the Joint Agency Process with the Energy Commission and the Public Utilities Commission, and we actually had a workshop yesterday to discuss the POU's specific targets and potential methodologies for getting to those.

Looking at IRPs, they are required to procure at least 50 percent renewables by 2030 for the Renewables Portfolio Standard Program, required to insure reasonable rates and to minimize ratepayer impact, and we're certainly cognizant that that's a big factor for POUs as you think through what these procurement plans look like.

Also, looking at insuring that system and local reliability are maintained. So I think for EV chargers that's going to be a big factor of, you know, where they're located, how many, what kind we're looking at.

Looking at enhancing distribution systems and demand side energy management, and really, a big one for today's discussing is minimizing local air pollutants with a priority on disadvantaged communities.

So in addition to the requirements of what the IRPs must address, or must meet, these are the requirements for what must be addressed in the POU
IRPs. And so that includes energy efficiency, demand response, energy storage, Transportation Electrification, a diverse portfolio and consideration for the resource adequacy piece.

And I think today's discussion will cover a little bit more of what the Energy Commission Staff is envisioning it means to address Transportation Electrification. And so you know, Commissioner has stated, but we're really looking for feedback and input from stakeholders here.

So this is just high level, sort of guiding principles. This was from the workshop that we had on February 23rd, that's really looking more at the larger set of guidelines topics that we're going to be discussing.

There's another slide that'll show you what those topics were in that previous Staff paper. But really, for the guiding principles, you know, we've heard from the POU's and we understand there's a need for flexibility to consider local planning needs and local factors that impact what the IRPs will ultimately look like, but still making sure that they're meeting the requirements of SB 350 for the GHG reduction goals and the other -- like such as the 50 percent renewables.
Looking to leverage and eliminate sort of duplicative data requests, so leveraging other reporting wherever possible, and then to the degree that is possible, trying to encourage consistency across the different utilities when they're reporting, to help provide a statewide sort of snapshot for policymakers.

And this is sort of the snapshot that I was talking about for the previous Staff paper that was published ahead of a February 23rd workshop that talks about the topics for the POU IRP guidelines that are currently being developed.

And really, that was a discussion paper that hit on a number of those topics you see on the slide here. There's a link at the bottom here, and really, just, you know, wanted to highlight that there was some good discussion at that workshop and in the written comments.

But I think today's discussion really does more of a deep dive on the Transportation Electrification piece to help you fill in some of that discussion. Just a quick overview of the process that we've taken to get here where we are today.

So there's been a number of workshops the
Energy Commission has conducted over the past year or so, and so starting on April 18th last year there was, you know, a big discussion of some of the POU recurrent planning processes and feeding into, hey, what are the ultimately guidelines going to look like.

We had a Transportation Electrification workshop in the fall and really started that discussion I think the Commissioners talked about. Then we had some specific topical workshops, one on December on the renewables and energy storage components of IRPs.

What's not on the slide here is that there's also been a big -- many discussions on the energy efficiency doubling target-setting piece, and that ultimately feeds into the IRPs, as well. And there's also a note here, you'll see at the bottom of the slide, that for the Energy Commission in 2017 the IRP discussion has been consolidated under the IEPR docket.

And so that's 17 IEPR 07, and so I think everyone's dialed in on that, but there's a link here on the bottom that shows you, you know, where all these things are coming together in 2017.

So the conversation continued this year. I
already mentioned that February 23rd there was a workshop. Actually, there were two workshops. The first was a discussion of how to -- potential methodologies to get to a GHG target for the electricity sector and for the CPUC jurisdictional entities and the POUs.

Then later in the afternoon there was a workshop that talked about the guidelines topics that would ultimately feed into the Energy Commission's draft guidelines that are being developed. There was a followup webinar on March 13th that really got into a little more of the specifics with stakeholders, with POUs about what their interests were and what their questions were about some of these proposed discussion topics.

And then again, yesterday we had the follow-on workshop to discuss with POUs specifically potential methodologies for getting to those individual GHG targets for use in IRP. And certainly, we're not done yet.

There are a lot of workshops slated, including the one today that everyone's here for. There is a Staff webinar this Thursday to discuss inputs, assumptions and administrative review for POU IRPs.
And really, this is looking at some of the specific tables and inputs and allowing for a deeper discussion on some of those pieces that will feed into the guidelines themselves. So I encourage everyone to tune into that if you're interested.

There's a second Transportation Electrification Workshop coming up on the 27th that's focused on the medium and heavy-duty sector, and all this is leading up to ultimately a workshop on May 25th to discuss Draft Guidelines that will be posted in advance of that workshop.

And then taking comments from that workshop, pulling it all together and the Staff intends to have final guidelines for consideration of adoption at the July 12th Business Meeting for Commissioners.

So you know, and I mention this briefly, but there are a number of other efforts that are still ongoing that will ultimately feed into or factor into the POU IRP development; the GHG emission reduction targets that are being developed by the joint agencies.

A lot of the work that's being done on the energy efficiency doubling target-setting effort that will ultimately be completed after the guidelines, but is still very relevant for the discussion of
IRPs; the RPS Regulations to meet the 50 percent RPS for POUs are still being developed.

And then another factor that we heard discussed yesterday is the Power Source Disclosure Program, the AB 1110 Program, and the discussion of the GHG Accounting Protocol and how that factors into sort of helping to track progress towards the POU specific GHG goals. And that is the end of my presentation. So thank you.

MS. RAITT: Thanks, Mike. Next is Amy Mesrobian from the CPUC.

MS. MESROBIAN: Good morning, everyone. My name is Amy Mesrobian. I'm an Analyst at the California Public Utilities Commission, and my presentation today will be providing some additional context and background about the state's work in promoting Transportation Electrification.

So the CPUC, the California Public Utilities Commission, oversees, among other things, the electric investor-owned utilities. And we've been working with the IOUs over the past several years to develop EV rates, deploy EV infrastructure, a charging infrastructure and look at how to best integrate electric vehicles within the electric grid.

So today I'm hoping to share some of the
work that we've been doing with the investor-owned utilities to promote Transportation Electrification, pursuant to SB 350, with a goal of sharing some ideas and best practices with our colleagues at the CEC and POUs who may be working with -- working on similar investments as the IOUs.

And as the Commissioners noted, the agencies have all been working really closely over the past several years on SB 350 implementation, as well.

Okay. So the CPUC has a slightly different role from the CEC in terms of implementing SB 350.

So since we more directly oversee the investor-owned utilities, in SB 350 there's language requiring the CPUC to direct the investor-owned utilities to file plans with us, to promote widespread Transportation Electrification.

And so one difference to highlight here is that the investor-owned utilities have to submit all of their proposals to us at the CPUC for our review and consideration. So based on the language in SB 350 and our existing regulatory review process, we were thinking about what kind of direction we needed to provide to the investor-owned utilities for us to successfully review any of their applications that they proposed.
And that's where we developed some guidance that's pretty similar what the CEC is presenting today. So Commissioner Peterman put out a Guidance Ruling last fall, directing the utilities to provide certain information in their applications that they're filing to us, and the applications contain a whole portfolio of different projects and investments.

So the first piece of Guidance offered was to address some key areas in the areas of rate design, expanding the focus of the programs from light duty into the medium and heavy duty sectors, to make sure that we address air quality concerns, to leverage the results of previous pilots, completed both by the investor-owned utilities and other state funded programs and other national, international projects, as well, and to align with local, regional and state transportation planning and investment.

So again, just making sure that we're all coordinated in our investment strategy to bring the best results for the state, and of course, promoting safety. So in thinking about the scale and scope of the applications that we were looking for from the investor-owned utilities, we wanted them to propose programs that would help get us to our long-term
greenhouse gas emissions reduction goals.

And so we wanted them to think about what those goals were and use that target to develop programs that would get to those greenhouse gas emissions reductions. And we also wanted the utilities to target different sectors, both with pilots and programs, to make sure to get experience in different sectors and start making sure that markets and technologies are developed in all the sectors that we need to meet our state's ambitious Transportation Electrification goals.

So additionally, in the Guidance Ruling we included minimum projects descriptions from each of the utilities' proposals. So when the utilities filed applications with us we required all of this information so that we could evaluate it in our public process.

So this description included things like the market segment and the vehicles targeted. So this could be something like port equipment, the time frame, so how long the project would take to implement, relevant regulations that the project would help meet or would be supported, the number of vehicles supported by the project, a plan for monitoring the success, evaluating the program,
determining what the lessons learned are to either scale up or not continue with the pilot.

What the total costs of implementation are and how that impacts rates and ratepayers; what the additional grid impacts are from their proposal; how that could be mitigated by price signals or other load-shaping mechanisms; how they might integrate renewables with their project and how they could encourage charging at the right time to maximize their assets and proof load factor.

We also asked them to identify project partners and all their funding sources that they could leverage so that they can make their dollars and their ratepayer dollars go as far as possible.

And we are looking for emissions benefits from each of the proposals in terms of greenhouse gas and criteria pollutants and a particular accounting methodology to make sure that we think that's a reasonable estimate, so we know how to gauge if we're on track to meeting our larger goals.

And then finally, something that's important for utilities is mitigating the risk of stranded assets. So we want to understand what their plan is for that mitigation. So again, that Guidance went out in the fall of 2016.
These are all the things we asked for the investor-owned utilities to provide us in their applications. And so in January of 2017 the three largest investor-owned utilities that we oversee, Pacific Gas and Electric, San Diego Gas and Electric and Southern California Edison, submitted applications to the CPUC.

And basically, they requested, the big blue slice is about $3/4 billion of funding in the heavy duty -- medium and heavy duty sectors and about a $1/4 billion for the light duty sector and other kind of related programs.

And so I wanted to share this just to kind of give everyone a sense of what's going on in the investor-owned utilities space to the extent that they're interesting projects or they're lessons learned that we can share with the POUs.

So I put this graphic sort of mostly for reference. I don't really want to go through it here today, but just to give you a sense of the different types of projects that the investor-owned utilities are proposing.

So they roughly break down into infrastructure to support medium and heavy duty vehicles, infrastructure to support residential
charging, infrastructure to support things like airports and ports that are off-road, public DC fast-charging, taxi and ride-sharing incentives and education and outreach.

So our next steps at the CPUC are basically to continue to review and analyze the utility -- the investor-owned utility proposals and make a decision later this year about which ones we would like to see move forward and if we need to modify any of them to maximize benefits before moving forward with them.

We also have three smaller investor-owned utilities under our jurisdiction and they're going to be proposing their applications this summer. So again, you know, one thing that we're thinking about is some of the smaller, publicly-owned utilities might share some characteristics with the smaller investor-owned utilities that we regulate.

So there might be good opportunities to share information and lessons learned in project ideas across those two groups. And just like the CEC is doing, at the CPUC we have a process to develop the integrated resource planning process that the investor-owned utilities will be working on.

And so specifically related to Transportation Electrification, I think there are a
few questions that we're hoping we'll answer related to the investor-owned utilities. So if we're thinking about Integrated Resource Planning and maximizing our greenhouse gas emissions reduction per dollar of program, maybe one thing that IRP can help us figure out is how much Transportation Electrification should we do.

How much funding should we put towards it? What are the greenhouse gas emissions reductions we can expect from it, relative to some of the other programs in the investor-owned utilities portfolios? And then another question that we have is, what's the value of flexible electric vehicle charging.

So if utilities can give the right incentives to customers to charge at different times of day, what's the value to the grid and what are the greenhouse gas emissions reductions values associated with some of those things.

So those are some of the things that we're thinking about. And again, to the extent that the POUs and IOUs can share lessons learned, I'd definitely be happy to facilitate that, and the CPUC will continue working with CEC, as well.

So I have my contact information and info for my colleague, Carrie Sisto, if you have any
questions. Thank you.

MS. RAITT: Great. Thank you. Next is Alberto Ayala.

MR. AYALA: Okay. Thank you. Good morning. Thank you very much for this very kind invitation. I have to say it's a distinct honor for me to be here before the Commissioners to give you our perspective on what's going on with respect to the Air Resources Board's Clean Vehicle Rules, which as I'm sure you are aware of, have been in the news recently.

So I will go through a few of those details, but before I do that I do want to take the opportunity to thank both the Energy Commission, as well as the PUC, for your support in building a very strong collaboration between our agencies.

You know, besides the fact that SB 350 is calling on us to work together, I think it speaks very well to the leadership at all three agencies, the fact that we've developed such a strong and effective collaboration, and I just wanted to make that noted today before I start my remarks. It's certainly a good process.

I was asked to give you an update, specifically, on our light duty clean vehicle policies. So I'm going to spend a little time going
into some of the detail related to what we call our midterm review, which has been the subject of some press coverage.

But before I do that, I do want to set the stage and I think Dr. Weisenmiller and the other Commissioners, I think you set it up very well for me. Why are we pushing so hard, so aggressively, in getting our state to full electrification of transportation, starting with the light duty sector.

As you noted, it's all about clean air for every Californian. It's also about the fact that California has stated that climate change is real and we are going to step up and do something about greenhouse gas emissions.

There's a third benefit and that's what I call the trifecta environmental benefit of sustainable transportation, and this third benefit doesn't get talked about as much as the other two, and that is, we're also mandated as policymakers to mitigate the human exposure to toxic combustion emissions.

And you know, the best example is, you know, the type of exposure that you get when you're on a busy freeway or a busy roadway, all those emissions lead to excess exposure that we are mandated to
mitigate.

So when you consider zero emission vehicles and zero emission tailpipe emissions, not only do we make progress towards our clean air and climate protection goals, but also, we reduce exposure.

And if you wanted to take that to a different extent, I should also be talking about a fourth benefit, which recently for my agency has been a very important aspect. And that is, as we engage more openly in the wake of the Volkswagen cheating scandal, zero emission vehicles also are cheat proof.

So there is no cheating. There is no significant expense in terms of public resources making sure that we adopt stringent standards, and that the auto industry that is subject to those standards actually follows the rules.

So great benefit for us all, societal and otherwise, from electrification transportation. The other important point that I want to make before I launch into the details is the fact that the Air Resources Board has made well known the fact that the regulation itself, policies that are command and control, play a very important role.

But when we consider the challenge of electrifying our transportation sector we fully
recognize, and clearly, the fact that I'm here with
the CEC and the PUC today speaks to this, we clearly
recognize that we need actions beyond just the
regulation.

And that's why supporting infrastructure,
deployment, supporting consumer awareness and
education and doing what we can to join efforts with
other leading jurisdictions around the world that
have policies and think like we do, why it's so
important for us to promote those partnerships,
because it's all about scale.

The way that we're going to address the
number one barrier to Transportation Electrification,
which is cost of the technology, is through economies
of scale. So we just got to get the numbers out so
that we can reduce the cost.

And again, why I'm here today is to
communicate in the most clear and strongest of senses
the fact that the role that electric utilities and
other entities need to play in helping the state
achieve our electrification transportation goals is
absolutely essential. We cannot do it without the
utility engagement.

So the first point that I was asked to
describe for you briefly is our midterm review and
the Board's final determination. So what is the midterm review? That is just a fancy name, but basically, the standards in question were adopted both nationally and in California back in 2012.

So as policymakers you can appreciate the work that goes into adopting the standards. That means the technical work that went into the standards, we finished that in about 2010. So the point of the midterm review was simply to acknowledge the fact that we were putting in place requirements that went all the way out to 2025.

We're likely bound to miss something or new information is going to emerge. New technology is going to come to the marketplace. We committed ourselves to doing a checkpoint, midpoint along the way and that's really what the midterm review is all about, is simply asking the question, are the standards as adopted back in 2012 still appropriate.

And you hear about the one national program, ONP, that was achieved when California agreed under its unique authority to align the requirements with the Federal Government, so that today the standards in place are essentially one national program, which again, hasn't happened often in the past, but we acknowledge that the national program was going to
deliver the benefits in terms of criteria, emissions, reductions and greenhouse gas emission reductions that we were interested in.

So before I tell you what the Board's decision was, let me review for you quickly what the actual standards under review are. So for California there's three components. The first one obviously is the greenhouse gas emission limit.

So this is a limit that gets applied to passenger cars, light duty trucks, the lighter ones and the heavier ones. So think of pickup trucks and the like. The number in terms of carbon emissions is 166 grams per mile.

So that's a number that is not often recognized. What you see in the paper is the now famous President Obama's 54.5 miles per gallon. In terms of reductions, what the state was seeking is about a 34 percent reduction from the baseline.

In addition, in California we were also reviewing what is today the most stringent PM emissions standard in the world, and that is the one milligram per mile. That's really, really low. And as somebody who's spent a lot of time in the emissions lab, I like to say we have a really good problem on our hands and that is, the emissions are
so low it's really hard to measure them, which is
great to say.

The third component of our midterm review,
which is probably the one that you're most interested
in, is the ZEV requirement, the so-called ZEV
mandate, which briefly was calling for about 15
percent of all new car sales in 2025 to be what we
define as zero emission vehicles.

So this is battery electric, fuel cell
electrics and the plug-in hybrids. And all three
requirements are blended into this one policy, which
we call the Advanced Clean Cars Program. So it's
basically just a simple, coordinated approach where
we keep track, we do the accounting in terms of, you
know, when you reduced the emissions on the carbon
side what does that do to the criteria side, what
have you.

How did we conduct the evaluation? It was a
multi-year, three agency process because California
agreed to collaborate with both EPA and NHTSA on the
midterm review. So at the end I think the tally of
those of us, career Staff at the three agencies, was
probably north of 150 people spending technical time
on the analysis.

It is to date the most robust, most
extensive, fact-based, technical analysis of the standards. And we benefitted not only from the agencies' work, but also lots of great input from the academic community, from the NGO community and from many others that obviously see the importance of the standards.

So what did the Board say? The final determination that the California Air Resources Board reached less than a month ago was essentially the same as the previous EPA. And the Board agreed with the Staff recommendation and determined that the standards were appropriate.

So the Board decided not to change any of the existing requirements for 2025, and that includes the greenhouse gas standards, the PM standards and the ZEV requirements. So that basically is a statement of confidence from the Board in terms of the technical analysis that the Staff conducted.

Interestingly, the record actually would have supported more stringency, because we have seen lower costs and more technology come into the marketplace than we anticipated. So the question in your mind should be, how come the Board didn't decide to pursue more stringency. I'll get to that point in a minute.
What they did tell us, and this gets to that issue, is the Board directed us to accelerate and do whatever we can as an agency working with you and others, these complimentary policies that are not regulations; so anything we can do to support infrastructure, anything that we can do to enhance consumer awareness and education.

So it's basically continuing and doubling down on the efforts that we have so successfully been working on together. The action that the Board took completely and officially closes the midterm review. So for us, we're not looking back anymore.

We're looking forward, and that's really why the Board decided not to do anything to the standards, because what the Board told us is they gave us direction to begin today working on the next set of standards, which will come for the model year 2026 and beyond.

And this gets exactly to the point of your Workshop. The reason we want to focus on the 2030 standards is because this is going to be our down payment on the 350 commitments for the 2030 reductions.

So to the extent that, as Chair Weisenmiller stated, transportation will continue to contribute
significantly to our carbon footprint, the Air Resources Board 2026 standards will be the contribution to how do we meet that target, and I want to make that very clear.

Now, the final question, and again, I used one of the many newspaper articles that were written on it. What does this mean in terms of what the new EPA, the Trump EPA, is wanting to do? For us it's simple. We are willing to come to the table and we are ready to engage, to the extent that we can learn anything and there is useful information to us, for the 2026 standards and beyond.

If the auto industry and their actions are going to pursue relaxing existing standards, if they want to focus on issues that to us have been fully addressed, frankly, the Air Resources Board has no place at that table.

So from our perspective, as of right now we have not gotten an official invitation from anyone, the administration or the White House. But again, in our view we're moving ahead, because frankly, we don't have a lot of time to waste.

You asked about the Scoping Plan and how this fits into it, and as I just stated, the light duty electrification programs are basically one of
the fundamental building blocks in terms of the
scenarios that we describe in the Scoping Plan for
meeting, not only the 2030 target, but most
importantly, this will put us on track for the 2050
long-term target.

And what does that look like? The 2030
target is going to be a monumental challenge for us
all. No question. Let's not sugarcoat the
challenge, because as we have done our analysis very
similar to what your own staffs are doing, and again,
we welcome the opportunity to coordinate the
technical analyses and the tools, for us to be able
to stay on track and meet our multiple goals we're
looking at more than 4 million ZEVs on the road by
2030.

And you know, if you consider that best case
scenario in 2025 we're going to get to 1½ million,
you know, here we are facing yet another hockey stick
approach, which we have all been fighting not to do
again. Now, there's a lot that can be gained by
continuing that collaboration.

And clearly, we want the auto industry to
engage with us in a constructive way, because the
challenge we have is one that we're going to need
everyone's good ideas to be able to come up with a
sensible policy that clearly reflects the realities of the market today and in the future, and at the same time allows us to meet our targets.

So that's basically our focus. Where we do from here is, our direction from the Board was clear, we committed to come back to the Air Resources Board with the next set of standards no later than 2020. You may say that's a long time, but I do feel that we have a good, solid two years of technical work that needs to be done.

There's a lot of thinking that needs to be had. We have some near-term issues that we have to deal with, and we also have some long-term emerging trends in the auto industry, like autonomous and connected vehicles, and car-sharing and all those exciting things that we're all hearing about.

My goal, and I'm going to do whatever I can in my role at the Air Resources Board, is to come up with the best and smartest policy that achieves the goals that we have for protection of the environment, but at the same time guides these emerging trends in the right direction, because my fear is these trends in the auto industry are going to happen no matter what we do.

And I don't want us to be on the sideline.
I want us to be actively engaged, and hopefully, guide the policies that will set the stage, not only for our country, but for the world. So thank you very much for this opportunity.

MS. RAITT: Thank you, Alberto. Next, we have Noel Crisostomo, to talk about the Draft Transportation Electrification Guidance for POUs.

COMMISSIONER SCOTT: Right before Noel jumps in I do just want to say, thank you so very much to Alberto from the Air Resources Board, for providing that fantastic presentation, and for the good partnership between our agencies working together and to Amy, as well, from the PUC for providing an excellent presentation and our partnership working together, because these issues are complicated.

It does require all of our agencies to work together in collaboration and be good partners, and I would echo the fact that I think that we are doing that. I think the scene-setting that we just did was fantastic, the presentation from Mike talking about what the Energy Commission is doing and Amy to talk about what the PUC is doing and how we can coordinate key components of that, and then Alberto with the context for why we're doing all of this and why it's so important. So I just wanted to highlight that
before we transition to Noel.

MR. CRISOSTOMO: Thanks, Commissioner. My name is Noel Crisostomo. I'm an Air Pollution Specialist in the Fuels and Transportation Division of the CEC, and thank you for coming to the Workshop today.

And I'll be presenting on the Guidance for Transportation Electrification for the POU's Integrated Resource Plans. We have a copy of the Draft Guidance out on the table. So I'm hoping that everyone has a copy of that.

The outline of my presentation is to provide a policy background for Transportation Electrification from the CEC's responsibilities, and to set an objective for our TE planning for the POUs. Next, I'll overview the recommended information data and reports that are detailed in the Draft Guidelines, and third, I'll end with some thematic questions for today's discussion, which will engage with technology providers, stakeholders from industry, and of course, the publicly-owned utilities who will be responsible for submitting plans and implementing programs.

So I'll reference first the Guiding Executive Order from 2012 in which Governor Brown
ordered the agencies to establish benchmarks for
essentially a transformation of our sector -- of the
transportation sector towards zero emission vehicles.

In particular, the Energy Commission is
helping to achieve by 2020 a number of these
mandates, including infrastructure supporting 1
million zero emission vehicles by 2020, increasing
cost competitiveness between ICE vehicles and plug-in
vehicles, accessibility to mainstream consumers,
widespread electrification of the transit and freight
sector, overall reduced greenhouse gas emissions on
the order of 80 percent reductions in the sector by
2050, grid integrated charging infrastructure, and an
expanding private sector role to support new jobs in
the electrification of our transportation.

More recently Senate Bill 350 requires the
POU's consideration of Transportation Electrification
in their IRPs. And as Mike discussed earlier, there
are a few important points to highlight. The POUs
shall, "address procurement of Transportation
Electrification among other resources in their
integrated plans."

They have to meet the goals of Public
Utilities Code section 454.52, sections (a)(1)(C)
through (H), which regard distributed energy resource
integration, improvement in distribution system, diversity, reducing impacts on rates, reducing greenhouse gas emissions and improving air quality to support our disadvantaged communities who are disproportionately impacted by emissions.

Lastly, the CEC under the section of the Senate Bill, may adopt guidelines to govern the submission of information and data and reports needed to support the CEC's review of the POU's integrated plans.

When we combine those two frameworks, SB 350 and the Executive Order, the POUs, in our opinion, can provide indispensable contributions to Transportation Electrification in the state through an integrated resource plan.

Thus, we recommend that, as I'll be going through in the next slides, that the following information, data and reports to serve as a best practice benchmark, for the POUs to support their contributions to the state's transformation.

We'd like them to support charging infrastructure that is integrated with the electricity grid, enables widespread electrification of all segments in order to reduce greenhouse gas emissions and air pollution with what Alberto was
The following slides and the Guidance that was published last week build upon the Draft Staff Paper that was released in February and the Proposed Guideline Topics for POU IRPs. And so it elaborates upon that draft paper in terms of additional data and detail to help the POU's understand what -- or help us convey what we think could be helpful for the POU's to report.

So in developing these Guidelines we recognize a few really important points, and I want to emphasize them here. The additional information, data gathering, analysis and its incorporation into programs, will require additional time and resources. That fact is not lost upon us and we want to be able to be flexible and to recognize the POU's independence in developing their IRPs, given the really diversity of time and constraints faced by each POU.

To this point, we did account for the need for recognizing diversity in the priorities. From a local level POU's are regulated by independent boards at the municipal level, with different capabilities, resources and focuses on technology.

This is because no POU or utility's alike,
and so we want to emphasize the need to remain flexible in this respect. Thirdly, POUs' electrification analyses, plan preparation and eventual accommodations of these new customer loads is an evolving and ongoing process.

This is not going to be an easy transformation of the state's single largest source of greenhouse gas emissions. So we really look forward to working with the POUs in these planning efforts.

So one of the themes of this day and one of the theses of the plan -- of the Guidance is to welcome your ideas and explore how the Energy Commission support the POUs' individual progress towards widespread Transportation Electrification.

And as I go through the next slides in detail, please refer to the Staff Proposal so that I don't bore you with every single bullet point. So the first area of the IRP information was to quantify, characterize and locate Transportation Electrification load.

This includes the need to identify the number and types of Transportation Electrification vehicles, charging infrastructure and customers. Associated with each of those things are the need to
characterize the load that is being consumed, energy and demand, and the tariffs that are characterizing the behaviors of customer charging.

In addition, from this electric use, of course, there are greenhouse gas emission and air pollution reductions for the state on the whole, although there is a fuel switching effect there. And so we want to understand the methodology that is being used for accounting.

The guidelines reference the need to align with the ARB's inventory, which provides a rigorous process for accounting for the different types of electrification in the state. The ARB inventory linked in the paper provides an example of the economic sector analysis, in addition to a proposal for IPCC or Scoping Plan categories for the inventory.

The next area in the report is the need to identify Transportation Electrification programs. This provides some qualitative -- a qualitative aspect to an otherwise potentially data-heavy set of information or set of reports.

But we want to provide the POUs an opportunity to talk about their investments, incentives, tariffs or rates -or generally- programs
that they're using to help encourage electrification. We would like them to also specify what types of market barriers they're hoping to overcome with solutions that they would provide to their customers, and to explain how they are prioritizing disadvantaged communities.

Pictures here are just of highlights from the Center for Sustainable Energy's implementation of the Clean Vehicle Rebate, in which LADWP and SMUD are doing pretty well among all other utilities, all other major utilities, in terms of getting people on -- getting people knowledgeable of EV rates to ensure economic effectiveness of their investment in EVs.

But we also understand that not all utilities in the state have TOU rates or advanced meter infrastructure. And so we have to think about how we can insure that economic effectiveness. In addition, this is a screen shot of a sector of the state, the South Coast around Los Angeles, that will be recurring throughout the other slides just to show how diverse and impacted the South Coast is in terms of the air pollution that we have to mitigate. Here, I highlight disadvantaged communities.

A third part of the Guidelines are the need to explain how the TE programs have been prioritized
and leverage external funding. First, prioritization is an important point to emphasize in order to address the POUs' specific emissions inventory.

One of the challenges with electrification is that it's hard to use rules of thumb in assuming that the POUs have 20 percent of the load, therefore, they will have 20 percent of the transportation. As we saw previously, there might be really important corridors for ports or transportation infrastructure that lead to interstate or intrastate commerce.

And charging stations along the way to accommodate these mobile sources will be a dynamic problem that we haven't really addressed yet. In addition, funding leverage is really important in order to reduce ratepayer impacts.

POUs generally are much smaller than the investor-owned utilities, and everyone has different carrying capacities from a rate perspective. And so we have to understand how the POUs will strategize, bringing in external sources of funding and align with state efforts to support electrification.

Fourth, education and outreach. We'd like to understand how the POUs will qualitatively engage with their customers to get the programs, make the programs successful. In particular, we'd like to
have them specify any focus or particular coordination efforts for facilities counting for large portions of mobile source emissions.

This graph is not a -- this map is not identifying mobile source emissions, but stationary emissions using the ARB's integrated emissions visualization tool. But to my point previously, we might have distribution centers or stops along inter-regional corridors, which would be really important to reduce freight emissions or to enable long travel across the state. One hope is to identify where these key sources of emissions are.

Fifth, a need to align with state policy and with local needs. So the Draft Guidelines provide just a smattering of different state reports that have been guiding documents in planning for electrification. We'd like to understand how the POUs are leveraging those objectives and strategies.

And in addition, because the POUs might be small, and this is an example of, again, the South Coast, where you have many cities and dozens of POUs within two hours of driving distance, there might be a need to coordinate across utilities, even with the IOUs, as Amy had mentioned, to insure that regional and infrastructure needs are coordinated, investments
are effective and to insure that charging statements
and the customer experience are accessible,
interoperable and easy.

Sixth, and finally, the POU Guidelines
suggest coordination with -- the coordination of the
Transportation Electrification Programs with
distributed energy resources. So the Guidelines
request a description of how TE is going to help
overall DER planning efforts to insure that our
charging behaviors are consistent with the electrical
grid conditions, which are quickly changing.

So this is a graph from yesterday's ISO
renewables watch, which shows that just generally we
could potentially add charging during the middle of
the day to absorb wind and solar and to reduce the
net ramp, as well as potentially provide peak rates
or dispatch demand response to reduce the head of the
duck.

So again, I'd just like to reemphasize the
need to, one, to review the Guidance for detail and
to emphasize the -- our attention to the need for POU
flexibility, independence and our ultimate desire to
provide insight to both POU and state investments in
electrification.

So I'll close with some thematic questions
for discussion later today. So we'd like to pose some hypotheticals.

What about the benchmarks and Guidance are unhelpful or helpful in planning for electrification?

What can be used to inform change in grid operations? What can most effectively be used to communicate the POUs' contributions to the statewide effort and to communicate your needs for assistance to the Energy Commission?

What would be better enhanced by referencing other reporting conventions or modeling conventions?

What could be made consistent across the utilities to Commissioner Scott's point, to enable appropriate head to head comparisons reflecting -- that account for differences in POUs?

And lastly, how could the Guidance treat the evolving Transportation Electrification industry that we're be discussing today in terms of forecast and charging technologies? What types of information or narratives are needed to ensure that these IRPs are helpful for the five-year time planning horizon that we're asking for them?

So more discussions will follow during the afternoon panel, but I look forward to speaking with you and hearing feedback throughout the day. And
with that, any questions? I welcome any comments or questions.

CHAIRMAN WEISENMILLER: Yeah. I have a question. Couple weeks ago I was in Los Angeles and Ron Nichols was giving a presentation before me, and Ron indicated that Edison has 40 percent of the DACs in their service territory.

And shortly after that LADWP said they had a lot. And I guess one of the questions is, going back to the DACs for the POUs, be useful to get a sense of the percentage of the DACs in the POU service territories, and particularly, which ones have the most. Similar to what Ron -- you know -- the 40 percent number from Ron.

MR. CRISOSTOMO: I have heard that Edison stat before and I have ran numbers to confirm that. It really depends on the locations of the POUs and how they overlay with the economic and air pollution considerations of the CES layers, but we can start running that.

CHAIRMAN WEISENMILLER: That'd be good.

COMMISSIONER PETERMAN: Noel, thank you for the presentation. I'll just note, I really like the Guidance, too, for the POUs to provide information about their Transmission Specific Emissions
Inventory, because you can imagine, there could be real variation. And that's going to be helpful for us as we're seeing, you know, what are the POUs that have a lot of light duties and where are they focusing versus POUs closer to ports and things like that. So I think that it's going to be very informative.

MR. CRISOSTOMO: Yeah. I'd like to echo that point. It's going to be a real challenge to kind of map the electrical service areas with the different types of jurisdictions that are involved in Transportation Electrification, including Air Quality Management Districts or air basin areas, county level, or cities-- all those interact in a way that we don't really have information about yet.

COMMISSIONER PETERMAN: I'm hoping ultimately, as you saw from Amy's presentation, our Staff is organized its thinking along with these technology categories, medium, heavy duty, light duty and also a kind of rate design.

So I'm hoping I'll be able to look at the POU proposals or plans and be able to see them also in that way, so we can have a sense of across all utilities, what is the medium, heavy duty infrastructure investment, what's the light duty
investment, et cetera.

COMMISSIONER SCOTT: Okay. Thank you, Noel, for this excellent presentation. And I'll underscore what Commissioner Peterman just said, actually, and you highlighted it as you went through your thematic questions.

But I do think that to the extent that we can be consistent about what's being reported and how it's being reported I think will be incredibly helpful, even things as basic as, like, how are we counting charge points, and are we reporting things in kilowatt hours or in kilowatts.

And I think there's a few things like that, that sound pretty basic, but will actually at the end of the day when you kind of roll them up and you're trying to look across the IRPs will really help people to compare, just as you said, these apples to apples, versus having to do different conversions or dig really deeply into a methodology to understand how one IOU calculated something differently than maybe POU did or vice-versa.

MR. CRISOSTOMO: Okay. So I guess we can call Tim to introduce the next panel.

MR. OLSON: Hi. My name is Tim Olson, with the Fuels and Transportation Division, and I'm going
to introduce the next two speakers. To begin with, some of the questions POUss wrestle with include how much electric vehicle growth will occur in their service areas, when will the growth occur and which submarkets might experience that growth.

Of course, insights about these questions provide critical information about the need for electric vehicle charging infrastructure investment, how much is needed, whether that's government incentives, private investment or in this case POU rate basing and their investment.

Next two speakers are distinguished in their field in conducting and publishing independent analyses, highlighting scenarios for the electric vehicle growth worldwide. We are interested in their conclusions about California's markets today.

Alejandro Zamorano is a member of the Electric Transportation Group at New Energy Finance, and Derek Jones is an Associate Director with Navigant's New Energy Practice. We asked both speakers to respond to questions we raised in advance and look forward to their insights.

We are pleased to have them here today. Welcome, gentlemen, and we'll begin with Alejandro and then proceed to Derek. And the Commissioners may
have questions after your presentation, but when
you're finished please sit at the table. Please find
a seat at the table and there may be followup
questions.

MR. ZAMORANO: Thank you very much. As Tim
said, my name is Alejandro Zamorano. I'm an analyst
with Bloomberg Energy Finance. I've been tracking
the transportation market for about seven years now,
for about two and a half year in California and based
out of San Francisco.

So I'm going to talk -- you know -- the
first thing I want to talk about is how 2016 ended,
globally and in the U.S., and then how we see 2017
forming. And then we'll get into much more long-term
views that we have developed and how we see that
industry, at least the markets for EVs, moving in the
next 20 years.

So the wrap up of 2016 in North America was
actually pretty good. As you can see, of the top
five selling models, four grew in number of sales.
Only one few, which was the Nissan Leaf. It's, you
know, one model that we are looking forward for an
update coming up this year or early next year.

But overall, a lot of green. If -- you get
data easier when you're looking at colors, and from
what you can see in this light. From a global point of view, growth in sales was 55 percent between 2015 and 2016.

You can see here that China is still showing the strongest growth, followed by Europe and followed by the United States. For 2017 we expect slower growth compared to what we saw in 2015; actually, compared to what we saw in 2014, 2015 and 2016.

This is not necessarily taking a view on political environment, but more a view on, you know, a much larger base that we're starting from compared to the previous years. For 2017 we expect close to 40 percent growth in sales or new sales, and by the end of this quarter that we're on now in 2017 we expect about -- we hope that 2 million EVs on the road mark to be achieved.

For the U.S. in 2017 we see roughly 240,000 new units being sold, based on what most of the OEMs have said. The trends are two very large markets looking up, as the European and the Chinese vehicle and EV markets are, and two moving sideways, one potentially decreasing, which is the Japanese market.

In the case of the Japanese market it's more related to the vehicle market than it is to EVs themselves, and that's a trend that we've seen for
the last at least four years. But then in the
American market, even though we say it's moving
sideways, we're still expecting some growth.

So it's not -- you know -- our predictions
for 2017 are not completely negative. Now, let's
take a look at the longer view. Two main drivers we
see in our long-term assumptions, the first one is
what's happening with technology, especially with
what's happening on batteries, and the second one,
which is a much more recent view and the one we're
working very -- you know -- we're looking very
closely at, which is what's happening with mobility.

Let's start with the first one. This is an
analysis from 2015. We are about to finish analysis
for 2016 models now. With incentives, BEVs are, the
total cost of owning a BEV in its lifetime is about
25 percent cheaper than in an average midsize
gasoline case.

The economics were not as favorable with
incentives for PHEVs compared to similar medium
sedans, mid-size sends running on gasoline. As soon
as we take away the incentives the numbers change
significantly.

And I show this to, you know, make sure to
send a very clear message that these incentives are
still necessary for plug-ins to be competitive against comparable internal combustion engine vehicles. On the side of technology, on the side of battery, one of the largest drivers of the cost of an electric vehicle with a plug is the cost of manufacturing the battery pack.

We've been tracking battery prices, the whole pack, following two different methodologies, one via surveys and one being a bottom up analysis looking into the energy-generating components that go into the manufacturing of the sale.

Here, I'm showing you the results up to the second half of 2015 of our survey, approached. What is interesting here is, one, the reduction in the range of data that we got from the companies that we historically -- you know -- Sign an NDA said they will give us a view on what they were selling their packs for.

And the second one is that there's a significant reduction in the prices that they have been quoting us. We then use that data to build a learning curve, learning rates. I'm showing you here two different learning rates.

One is for -- no, to show -- just to set the stage, which is the one with you see with a leaner
feed on blue. That's what we've been tracking since 2004 for the price of pre-selling silicon PV modules since 2004.

In 2016 we've seen an average learning rate or a slope of that leaner feed of about 25 percent. We started doing the same for the cost -- for the price; I'm sorry -- of the pack, of every pack that goes into an electric vehicle.

We began doing that in 2010. I showed you data in the previous slide starting 2012 because of the huge deviations we had on the data before 2012. But with the updated data from the survey that we carried out at the end of last year, that I will show you the results in a minute, we are now at our learning rate of close to 20 percent.

This is extremely interesting because we are achieving very steep reductions in those prices in a very short time. This is a result of the latest survey that allow us to form that 19 percent learning rate for the whole pack.

The weighted average price that was quoted by our participants was of $273 per kilowatt hour. That compares to our previous price of $350 per kilowatt hour in 2015. So almost that $100 reduction in about a year in the price of a battery pack.
I don't think there are many industries that can show this -- you know -- drops of such steepness in their costs. We then take that learning rate that I showed you before that we built and we apply it to forecast, you know, assuming that prices continue to fall at 19 percent on average.

Where will they be by 2030, and we get to roughly $73 per kilowatt hour by 2030, or a half a mid-point in 2025, which is another landmark from a policymaking perspective of about $110 per kilowatt hour.

The second approach we have for looking at this big component of the cost of the EV, which is the batteries, to do a bottom up analysis where we look at most of the energy-generating materials that go into the manufacturing of the sale.

And then we look at the materials that go into the manufacturing of the pack, and then we make some financial assumptions of how much it costs to build the facility to make these packs and, you know, configure [sic] them for sale.

We've done it twice so far. This is a much newer analysis. We started in 2015 and we found a cost per kilowatt hour of about $385, which is not too different from what we had surveyed of $350 per
kilowatt hour, just a little bit higher.

And the iteration we carried out last year also saw a significant decrease in the cost, taking it down to $223 per kilowatt hour. Here, you can see how the two methodologies compare, and then what we've done is we -- I didn't bring -- I didn't want to show you the -- I didn't bring the financial model that we used to forecast the bottom up analysis, but the message that I want to send is that following these two methodologies we get for 2030 in a range between 70 and $90 for kilowatt hour for the whole pack.

So it's kind of refreshing to see that following two different methodologies you can get to a similar range within such a long time period. What this means is that from a total cost of ownership point of view, parity, basically, you know, when economic parity of buying a plug-in versus buying an equivalent vehicle that runs on gasoline, it's reached between 2020 and 2030, depending on the size of the pack.

Using those what we call inflection points we've built basically a consumer based demand forecast. It's a mass diffusion model that we've developed using methodology that goes behind this
type of S-curved based forecasts.

And as you can see from the blue line that shows the penetration of EVs on new sales on that year-to-year basis, you can see that between 2020 and 2025 the knee of that exponential curve starts to get steep, and that's when the market gets incredibly interesting.

One of the points that Noel wanted me to discuss was how does this look with other forecasts. We actually are significantly more bullish, for example, BP, that is talking about a six percent inclusion rate by 2035; more bullish than Exxon, that is talking at about an 11 percent penetration rate by 2040.

OPEC is talking about 13 percent by 2040. And so just so you get a sense of how we are, we think that there's enough appetite for EVs, as we saw with launch of the Model 3 by Tesla, to think about it as a consumer -- you know -- consumer pool type of industry and not so much as a manufacturing pool type of industry.

So that's why you see some differences between what we say and what other organizations forecasting the industry say. The final driver that I wanted to show you is mobility, and that's huge
here in California, especially in cities in California, in big cities in California, and it's the case in San Francisco where I live.

And a way to set the scenario is just look at the amount of money that is going into companies that are developing new ways of using vehicles. What is interesting is that these schemes are most of them agnostic to what the energy source for driving the vehicle is, but we do think that there's a very interesting, you know, connection between high utilization -- between increasing by utilization of a vehicle from a total cost of ownership, and increased use of electric vehicles.

And to do so we basically took the total cost of ownership lines that I showed you before, this is the exact same I showed you before with those inflection points where parity on a TCO is based between 2020 and 2030, and we just doubled the electric miles traveled to 20,000 miles per year, and you start seeing those inflection points happening significantly sooner.

That means that schemes that result in higher utilization of vehicles tend to favor electric vehicles from a total cost of ownership point of view. What that means, if we're reversing and
nearing our mass diffusion and we start with this
cost parity significantly sooner, at around 2018, we
get a much higher adoption in the next 10 years, in
the next 15 years.

In the U.S. only by 2030 we see roughly
three more -- 3 million more plug-ins sold just as a
result of using plug-ins more, of driving plug-ins
more. And this is not completely out of the picture
because I'm sure that a lot of you know that most
vehicles are used roughly for about five percent of
their usable time.

So assuming that, you know, somebody that
has additional time, which is, you know, the case of
some drivers on ride-hailing companies that, you
know, already have the vehicle and they're simply
using the vehicle more, that utilization will tend to
favor the economics if it's an electric vehicle.

I want to leave it there and give the chance
to the other analyst to show his results. Thank you.

COMMISSIONER PETERMAN: I have a question or
two. As always, an informative jam-packed
presentation, but a couple of follow-up questions.
One on slide 16 you show EV sales penetrations for
future years. What's it for the U.S. in 2030?

MR. ZAMORANO: For the U.S. in 2030, I don't
have that number with me, but I can get it for you.

COMMISSIONER PETERMAN: That would be great if you could provide that, as well, if you happen to have it broken down for California.

MR. ZAMORANO: We do, yeah.

COMMISSIONER PETERMAN: Okay. I'd like both of those.

MR. ZAMORANO: Um-hum.

COMMISSIONER PETERMAN: And then I have a question or two related to the battery pack projected cost or just the current cost. And what I'm trying to understand here is what's the connection potentially between our EV deployment programs and increasing that local demand for EVs, and the production of the battery packs in the U.S.

And so as I saw that you're showing that U.S. plants at high volume can produce battery packs at a cheaper cost than average. I think it was like slide nine or so. Let's see. I think it was one more slide up.

Well, I mean, this is fine, but just in terms of how the batteries are disbursed or what that supply chain is. So is the market designed where you would site your battery plant closest to where the demand is?
Are location, travel costs prohibitive, or would we expect to get battery packs from China, for example, for the California market?

MR. ZAMORANO: Yeah. So if you look at where most lithium batteries are produced today. I'm not thinking about what has been developed in, at least in Nevada here in the states. The vast majority of the capacity is in South Korea and Japan. Yet, we use electronics, computers, laptops, you know, cell phones that are using those batteries that come from those facilities across the world. Granted that most of those batteries are manufactured in countries nearby.

So there's a point to potentially the cost of shipping the battery, but we haven't seen any evidence yet that is, you know, other than what's happening here in the states with -- particularly with making a factory, we haven't seen any evidence of other automakers shifting that manufacturing just because they want to be closer to where the market is.

COMMISSIONER PETERMAN: So this price point that large U.S. plants, you know, bigger than three gigawatt hours --

MR. ZAMORANO: Yeah.
COMMISSIONER PETERMAN: -- could bring the average price lower.

MR. ZAMORANO: Yeah.

COMMISSIONER PETERMAN: That's based on just the Nevada plant?

MR. ZAMORANO: That's based, we spoke to -- we didn't speak to the Nevada plant in that particular case. We spoke to manufacturers in other parts of the world, but not to the Nevada plant.

COMMISSIONER PETERMAN: Okay.

MR. ZAMORANO: Yeah. In fact, I actually do have the rate for 2030. It's 20 percent in the U.S., assuming equal utilization of vehicles, and increases to 23.75, assuming the full utilization of plug-ins.

COMMISSIONER PETERMAN: Thank you. And then just one more thing about the battery pricing. Is there a wide distribution in prices for battery packs?

MR. ZAMORANO: Yeah. We have a whole series of analysis on that and it's basically -- our theory is that there's a push for battery makers to develop what we refer to as symbiotic relationships with automakers.

And in that push to basically secure that the launch of a new line is using their packs, they
are undercutting a little bit their prices.

COMMISSIONER PETERMAN: Thank you.

MR. ZAMORANO: Yeah.

CHAIRMAN WEISENMILLER: Yeah. I actually have a couple, so let me -- sorry. I think we're going to hold her, but after she jumps in I'll sort of end it, too. I'm focusing on the current sales numbers.

MR. ZAMORANO: Yeah.

CHAIRMAN WEISENMILLER: And so the first question is how solid are the Chinese numbers?

MR. ZAMORANO: How solid?

CHAIRMAN WEISENMILLER: Yeah.

MR. ZAMORANO: As solid as our sources.

Yeah. There's an issue with, I think it began in -- she was at the end of 2015 where there were some fraudulent sales. Basically, manufacturers were getting the subsidy with the VIN number, but the car wasn't even -- you know -- the packs were never actually installed.

The government found some companies I guess guilty of doing that and they were -- you know -- they were fined, is my understanding, for doing so. So we did adjust our numbers to whatever the media, you know, that came out from that reported.
But there's an issue with that, with fraudulent VINs, and there's also an issue with what they defined as a NEV, as a new energy vehicle, which is what we defined as an electric vehicle here on the western world.

So we do have, we do find it tricky sometimes to shave some of the data that comes out, especially for low-speed vehicles, that we don't want necessarily to count because they're not compatible to models that are sold here in the U.S. or in Europe or the rest of Asia.

So I will say our numbers for China, the historical numbers, are as good as the data that is available, but the data that is available sometimes is not 100 percent accurate.

CHAIRMAN WEISENMILLER: Do you have a sense of what your correction is to the Chinese numbers?

MR. ZAMORANO: I can find out. I remember my Chinese colleague was the one who pulled those out when the modification was made, but that's an easy number for us to find, yeah.

CHAIRMAN WEISENMILLER: Okay. That'd be great. Other question was, it's probably been a couple years ago, but there was a chart from GM that showed U.S. auto sales coming back up, but basically
plug-in and electric staying more or less flat.

Is that -- you know -- at this point at least is the percentage of, you know, zero emission vehicles in the U.S. tracking the fleet, or is it still more constant?

MR. ZAMORANO: So we did that analysis last year where we wanted to find if electric vehicle sales in the U.S. and in Europe, in the two regions, correlated more to changes in oil prices that -- or if they correlated stronger, more -- you know -- more strongly to changes in sales of vehicles.

So basically, do EVs follow car markets or do EVs follow fuel markets. And we actually found a higher correlation with car markets than with fuel markets. And so -- which was a little bit surprising.

Of course, as you start hybridizing that vehicle, as it -- you know -- the closer you get to a HEV, then that correlation between EVs and car markets decreases and the correlation between the HEV and fuel prices increases.

But with BEVs there are much more higher correlated to car markets. And the other thing we found was that there's a strong driver of sales of BEVs and that is new model launched. And we did that
analysis also for the places where we saw -- you know -- some countries in Europe we saw an increasing number of, you know, pretty steep growth in the sales of EVs.

And we looked at how many new models were being offered in the last year or two years where we started seeing that increase, and we found that there's an interesting correlation there, but it's not strong enough for us to say there's a definite correlation, but it does have a positive impact in sales when new models are launched.

CHAIRMAN WEISENMILLER: The other thing we struggle with on a charger location is where to locate them. And historically, we've -- I don't, again, I'm not sure how granular your forecasts get, but historically we have assumed that areas which have been innovative in car purchases historically are the ones which will be more inclined to take up zero emission vehicles or BEVs.

Do you have any sense whether that's a good or bad assumption?

MR. ZAMORANO: I think it's a fair assumption, yeah.

CHAIRMAN WEISENMILLER: Okay.

MR. ZAMORANO: Yeah. There's an interesting
shift that we've seen, and it is as a result of what we -- I spoke very briefly on mobility, and it is on how, you know, if we are assuming that utilization is favorable for the -- higher utilization of the vehicle is favorable for the economics of own an electric vehicle, and we've seen new technologies that have enabled higher utilization of vehicles, either by sharing or hailing them, those vehicles to be electric are probably going to have very different requirements in terms of location and speed of those chargers, because the premise is different.

In this case those vehicles are going to be charged while used, similar to a gasoline car, not charge while parked in home, in a mall or at work. So that's something that we've been struggling to understand on, you know, how much does it change the thinking behind where those chargers need to be installed if we are starting from the premise that those vehicles are going to be used heavily in sharing or hailing schemes.

CHAIRMAN WEISENMILLER: And do you do forecasts of fuel cell vehicles?

MR. ZAMORANO: We are going to publish our new version in April -- oh, I guess it's probably out. If it's not our now it's going to be out in
May. So we have a big event next week in New York, and that's where our CEO is going to show those results.

CHAIRMAN WEISENMILLER: Great.

MR. ZAMORANO: Yes.

COMMISSIONER PETERMAN: Commissioner Scott, I have one more followup question. You know in terms of EV sales, trends, that policy support in China and Europe have been big drivers of the forecasts looking up in those regions. Can you just highlight what have been the most important policies in those regions?

MR. ZAMORANO: I'm always -- I tend to answer that question with, you know, direct purchasing incentives as probably the strongest driver, but I don't know the Chinese mechanisms well enough to say so.

But in Europe I would say that purchase incentives are probably one of the strongest drivers, especially up to now when the TCO of a BEV without subsidies in pretty much most markets is higher than the TCO of an ICE.

COMMISSIONER PETERMAN: And I was wondering if you've heard of or seen any interesting new financing models for the vehicles beyond the support...
of the direct incentives? I'm trying to think through a bit.

We've seen financing innovations in solar PV that have really helped to revolutionize the market, and it's not clear to me what the equivalent would be in EVs, but if you've seen anything elsewhere, I would love to know about it.

MR. ZAMORANO: We been looking at leases closely, mostly as a result of all the noise behind car company results in the last earnings season on, you know, how those inventories might be stocking up a little bit.

And definitely, there's a trend. You know, EVs are following pretty much the same trend as other vehicles in terms of being leased more than being purchased. New ways to finance them? We haven't really looked closely into that. Yeah.

COMMISSIONER SCOTT: I had a question for you on slides eight and nine, which is where you showed kind of the total cost of ownership with incentives, versus the total cost of ownership without incentives.

When you get from -- or have you guys looked at, once you get from the price that we're at now, which was about 273, I think, dollars per kilowatt
hour, into that I think it was 70 to 90 range, what does that look like in the total cost of ownership? Or is it because the batteries cost less you can increase the range and sort of -- that sort of counterbalances the gain, any of the benefits you may gain there in terms of cost?

MR. ZAMORANO: So basically, you start seeing those inflection points, those intersections happening significantly sooner. So for example, this is based on our current battery price forecast. So the reduction in those falling curves that I showed you with the 19 percent learning rate are reflected here in that reduction on the TCO of the plug-in.

Yeah. All right. Thank you.

MR. OLSON: Thank you, Alejandro. So our next speaker is Derek Jones with Navigant Energy Practice.

MR. JONES: Thank you, Tim, and good morning, everyone, Commissioners, Commission Staff and fellow Workshop participants. Thanks for the opportunity to come here today and to add onto what Alejandro shared with us all, as far as the global forecast and getting into the numbers.

So as Tim mentioned, with Navigant's Energy practice. We're a global research and consulting
firm. Our syndicated research service covers the
types of global, as well as U.S. and regional
forecasts, as Alejandro described, I'll cover just at
a high level.

From the consulting side what I was looking
to cover in particular today was what type of
consideration that POUs should think about as they
look towards these IRP forecasts going forward. So
that comes from my background with 10 years in the
DER space, having worked previously with PG&E on EV
forecasts, as well as the other IOUs in terms of
adoption and upgrade costs in my former life, and
prior to that working with Mitsubishi Corporation,
advising executives around the world on the U.S. and
global market.

So just to speak to my colleagues on the
research side, we have our Transportation
Efficiencies Research Service. They cover the topics
up on the board there, with PEVs, battery electrics,
hybrid. We'll speak to some of those acronyms as we
start to run through the presentation, although we
cover the other aspects of mobility, as well.

So from those forecasts and really through
our supply chain engagement, both on the government,
but as well, as what we think about the market
ecosystem conversations through the supply chain, whether it's OEMs, whether it's the service providers, whether it's charger equipment providers, or those that play in the various spaces through our little Venn diagram there.

That's where our analysts source that information and feed it into their forecasts. I engage them on the consulting end, closer to the market and to our clients. So with that in mind, Noel provided some of the questions that Alejandro mentioned, and I'm going to walk through them here.

Provided a fair amount of detail in the deck, just for the sake of the docket, having presented in these type of workshops before in my former life, but at least speaking to it, I'll look to move fairly quickly and keep it high level. So see if I can strike that balance.

First, then, expectations for the prevalence of PEVs. By 2030 we see at least in our base forecasts, and that includes the plug-in hybrid and the battery only, at 12.5 percent of global, light duty markets with a vehicle population that equates to roughly five percent or over 65 million vehicles.

Similar trends that we heard from Alejandro in terms of battery prices looking to decline faster
over time, as well as large uptake in the Asian markets really leading the way globally. But again, kind of back from that POU perspective, what can we look at down the road as we're looking indeed to 2030.

We see autonomous vehicle uptake, particularly beginning in the early 2020s, as a really kind of a monkeywrench in terms of forecasting and modeling today, because there is a significant advantage from the power train perspective with the electric vehicles, in that you have all electric components, reduced maintenance costs, wireless recharge.

That has a very compelling business proposition to that specific market if we're thinking about autonomous driving. And if it's in the ride-hailing or the car-sharing markets those issues really haven't played out and we're only at really the cusp of understanding what those are going to be.

So given those 2030 forecasts, there's a fast evolving market and a lot to observe as we go forward. So tracking that is key and certainly something that we advise our clients do. And you know, really, on the back of that is the 200-mile range barrier eclipsing in 20 -- or heading up to
2020 with the auto manufacturers here listed really moving that needle in terms of range anxiety, as I know folks in the room are familiar with today.

So with that, you know, how do our forecasts typically compare to what we see in the rest of the industry? Sixty-five million globally; could be perceived more on the conservative side, but really, in terms of 12.5 percent of the market is really more aggressive than what we've seen in other industry forecasts.

We do tend to be a little more conservative in the EIA, the Energy Information Administration, but relative to the other industry we're typically more conservative, and so you see that slightly more aggressive piece of the forecast flowing from that uncertainty.

Again, we're on the cusp of seeing some of these new models or new markets uptake this technology. So by 2030, again, ride-sharing, ride-hailing is really going to affect ownership rates and create variations in forecasts.

So you know, for a few of you colleagues that's certainly something to keep in mind since these are, you know, very tailored and specific markets with specific customer bases that may or may
not have a high prevalence of these markets.

So what then are the factors that are
driving PEV forecasts? Certainly, the total cost of
ownership model. Battery prices, as we heard from
Alejandro, and government subsidies certainly.

Comparison is a function of oil prices.

You know, generally our model isn't going to
-- doesn't deviate from much else of what we see in
the market. But two other things that we talk about
and in particular, customer sacrifice, something that
we're engaging in the market and starting to engage
with our clients as we try to work through these
customer problems, whether it's IOUs or POUs.

The capability of the range relative to ICEs
is certainly something that isn't new, but the
convenience of the charging stations is a piece in
terms of our modeling that is iterative. So within
infrastructure where the charging stations exist, you
see the prevalence and the adoption and then there's
a feedback look in terms of where the next station
might be located, the commensurate adoption and flow
from there.

But along from the tradeoffs and the
consumer sacrifice we also see model availability as
a key driver, and certainly, as we've looked out
across the country with California upwards of 24 models available in the market.

Areas in the south that have in some cases zero models, and PEVs or plug-in hybrids as we look out across our forecasts and we talk with our market actors there, and in talking with OEMs in particular the model rollout is a challenge.

Chicken before the egg in terms of demand, and from a dealer's perspective that can be a large hurdle where hard to stock inventory, that you're not fully convinced that the market's going to uptake when you're talking about stocking a vehicle as opposed to stocking a smart thermostat, right, in comparison to the EV market.

So certainly, something again just in using the national landscape for POUs in California to think about, since we have such a diverse stakeholder and consumer group here to think about. So model availability being certainly key.

But despite those challenges we certainly see across the OEMs, some really landmarks in terms of rolling out new models for customers with Chrysler having the first minivan hitting the market and Mitsubishi with a four-wheel drive SUV to complement some others in the market.
Certainly, the model availability and the availability of it to new consumer groups that wouldn't otherwise consider electric vehicles is -- does get at that barrier and is certainly something to keep in mind for upcoming forecasts at a granular level.

But you know, over time what is going to drive consumer demands, you know, with vehicles, with cars being part of the fabric of America, it's going to be those same core market drivers as today in terms of customer options versus their personal priorities.

And you know, for us it's certainly complex and challenging to simplify or to try to delve into those deep levels of what that future's going to look like from a personal priority perspective due to the evolving nature, as we talked about, with these new markets opening up.

But I would stress those other markets of autonomous driving, the ride-sharing and the ride-hailing as key pieces to keep track of going forward.

So pivoting over to the infrastructure side, you know, what are some ideas in terms of stimulating private investment to consider as if you're a POU and you're thinking about these issues.
As I mentioned, the way we think about it in terms of a modeling perspective is a feedback loop iterating over population growth, commensurate infrastructure option followed by then more growth. But you know, what does that mean long term? And the way we account for that is diminishing costs similar to the battery cost reductions of infrastructure installation. So if that is a key mechanism and the feedback loop can only grow more aggressively, recognizing that up-front cost, what are some recommendations or policies to think about.

Certainly, installation or equipment subsidization are out there; make-ready building codes, already broken ground here on that front in California, but certainly, more to be done as we start to think about really key markets like workplace charging where we see eight times more likelihood of workplace employees to uptake a PEV when they have that charging available.

So that's certainly something that we focus on and have been communicating across our national host of clients. But certainly,streamlining, permitting and processing, a familiar issue from the solar days in terms of making that a streamlined
process, as well.

So some infrastructure considerations to think about, and certainly, with 350 plus charging in the works, and new ideas from -- at least in talking to utility clients across the country about how to do that, certainly, there are challenges from a rate-making perspective in how do you roll in the costs of new infrastructure into volumetric rates.

And there have been some interesting ideas to share, particularly around leveraging DC directly from a substation for fast-charging corridors, and then in that case being able to roll those costs for that specific infrastructure into particular rates for those customers.

So there are some interesting ideas out there and efficiencies that are looking to be gained, which is a great sign from the market without really any major, you know, national regulation in that space. So more ahead on that front.

But in terms of these inherent uncertainties that we've been talking about, you know, how do those affect the outlook for deployment. So in terms of model availability we do see in the near term a significant impact, again, across our forecast.

We do think long term that the global
efficiency standards, so not just CAFÉ, but that
global pressure for the global automakers is going to
continue to weigh on those decisions, based on our
colleven conversations.

Certainly, recent changes in the U.S. market
for CAFE will have an impact, but long-term at the
global scale for these global automakers we do see
that impact being diminished over time. Again, going
back to the automated ride-sharing, we do see a
minimal impact because the convenience at the moment
of internal combustion engines for high vehicle
utilization is critical to their ability to deliver
fast services to their customers on demand.

But we do see it as a key opportunity for,
again, the economies of the power train for an
electric, all electric component vehicle with greater
reliability, lower maintenance cost, similar to the
infrastructure on the DC/FC side.

As a big up front investment those economies
over time I think will prove their business value
proposition and receive due consideration. So that's
at least in our perspective some key market outlook
things to keep in mind.

COMMISSIONER PETERMAN: Excuse me, just one
question. What do you consider long term or short
term?

MR. JONES: We do see, again, with 2020 being a large uptake in terms of -- or at least the initiation of uptake of autonomous, all these recommendations are with 2030 in mind.

COMMISSIONER PETERMAN: Okay.

MR. JONES: So I think by 2030 that's where we start to see that opportunity having some legs. And so I'll finish off just with the California's decarbonization goals and, you know, question being, are market conditions and forces sufficiently established in California.

I'm continually reminded when talking to clients across the country, well, remember, we're not California. So not all conditions are the same. So certainly, California is a well-established leader and the organic development is there, has taken hold.

So in terms of are the market conditions sufficient, you know, we see it in a more or less standpoint, and of course, it is a bit of a wait and see. But with subsidies in place, the organic development, certainly, the customer attitudes that are much more driven by identification with environmental and the greenhouse gas goals of the state, we see it as maintaining at the very least,
status quo.

But again, model availability when we're thinking about key considerations for POUs, what do dealers have in stock across the country. Fresno, where I'm from, you know, really, are dealers stocking those cars to be able to change those customer attitudes and do the types of ride and drive events that really start to -- getting back to my comment about the changing the fabric of the American driving experience, there is kind of a lightbulb that goes off when you drive your first hybrid electric or your first all battery, in particular, that this is something I can rely on day in and day out, take my kids to school, get to work and be a "plug and play" part of a customer's life.

So again, for that local POU perspective those are key considerations that we recommend keeping in mind. Do dealers have them? How are they working with the utility in terms of taking recommendations on rates or any other type of programs, putting that in the customer's hands and having that part of the consumer education process, those are all key considerations at a local level that we see driving consumer awareness and education, and certainly, that's been a larger part at the state
level and with the IOUs so far.

With the ZEV program components, certainly, monitoring and tracking them over time to deal with these uncertainties that I mentioned earlier is going to be important, agile and attentive, certainly in this docket and across proceedings.

There is a lot of attention, so I don't have a lot of fear about the careful attention to the changes over time, but making informed decisions will be important. So then lastly, private and public intervention.

Just some ideas to share, but we can talk a little bit more during the question and answer section, but additional approaches. So I mentioned workplace, and specifically, workplace subsidization with DOE looking to fall back on their program on the workplace side.

Certainly, a place to step in and alongside and along with manufacturers, you know, conversations with OEMs. There's certainly a willingness to share data and to make that available across the country. I think a challenge or a trick you run in there with is points of contact for them are challenging to have at each commission, understanding each regulatory environment.
There's certainly a willingness, but there's not a commensurate number of regulatory folks across all the OEMs to be able to deliver the data in this specific way. So being able to plan for infrastructure I think is important on those types of conversations.

It can benefit California's goals, as well as grid stability. But you know, at a city level programs for low emissions zones are ideas that we've seen floated around, mandates for those automated driving systems; so as we're thinking about those coming online, what types of mandates for those systems post the R&D phase, after all those items are understood.

Subsidizing car-sharing programs with used PEVs, certainly, the secondary market is an opportunity for a second life for those cars, and again, with ride-hailing fleets, subsidizing and encouraging those to benefit the air quality and decarbonization goals.

So just a handful of things to consider and chat about, but I'll leave that for the Q and A session. So thank you very much.

CHAIRMAN WEISENMILLER: A couple questions.

Do you do fuel cell forecasts?
MR. JONES: We do fuel cell forecasts. I do not have those numbers on me, unfortunately, but certainly could follow-up.

CHAIRMAN WEISENMILLER: Yeah. If you could submit those for the record, that'd be great. Also, I was really interested about your building in a feedback loop for charging stations, and again, was trying to understand some of the correlations there, and obviously, the question of charging stations in the sense of workplace, you know, as we sort of struggle through the proverbial questions, where best to put those, trying to understand at least how you've built that in, and the basis for that feedback analysis.

MR. JONES: Well, certainly, on things like workplace that's handled more, tailored, you know, locational basis. So in our global forecasts there aren't those assumptions around workplace in particular, but infrastructure in general as a function of PEV adoption, recognizing that infrastructure would be available or at least targeted for those areas.

But when we think about specific siting and when we work with clients on that, it's very much corridor driven, VMT, and proximity of major
causeways, thruways and so on. So those -- that
level of granularity, we typically do in a one-off,
ad hoc fashion.

CHAIRMAN WEISENMILLER: And do you
distinguish -- well, obviously, one of the messages
is that fleet vehicles generally should be more
attractive, but trying to understand the nature of
the forecast.

Obviously, I think all of us were, sort of
when China started talking about requiring all taxis
in Beijing and Shanghai to be electric, certainly,
that was a signal to the world about really trying to
move the needle here, and again, trying to understand
in terms of what the economics are in that area, or
again, how to -- what the forecast is for fleets as
opposed to personal vehicles and how -- what the
policies we might have in those areas.

MR. JONES: Well, I did mention in one of my
recommendations that sort of ride-sharing fleets is
an example of fleets as an opportunity, just be -- it
is their function I think of the business
proposition.

And we mention that taxis having their own
value proposition and own regulated requirements as
opposed to something like a ride-share is a little
more advantageous, since it is a little more business value-drive.

So to be specific in terms of on demand delivery and cost of ownership, being driven by the owners themselves in ride-sharing, that being more of a personal one-off decision, as opposed to a full company putting out that up front cost.

So as a function of that being part of the overall forecast over time, I mentioned it's an uncertainty, but certainly happy to delve in deeper with my analysts to see if there's something in more depth that we can provide. Great. Thank you.

MR. OLSON: Okay. Commissioners, I have a couple more questions and could we migrate to the table here and finish our discussion for --

(Pause)

MR. OLSON: Thank you, gentlemen, for the great presentations. One of the things, this Workshop is about publicly owned utilities and their efforts to plan for electric transportation in their IRP process, and I wondered if you could comment on how your services, your capabilities can be of value to the publicly owned utilities.

Some of them are very small. Some of them are large, and maybe kind of look at things like what
databases do you use to track EV adoption and what
sources of data might be helpful to use your
analytical tools to then benefit the POUs, and
looking at it as kind of a facilitated effort to
provide that support.

MR. ZAMORANO: I think that the biggest
value we provide is that we do the same in pretty
much every country. So we can give a perspective of
what has worked in other places and what hasn't
worked in other places.

Sometimes, you know, when you think that
what you're doing is the first time anybody has done
it, chances are that somebody has tried it somewhere
else. So you know, some of our clients see a lot of
value in that.

In the particular case of my firm there's
now clear connection between what's happening in the
renewable energy story with what's happening in what
we call the advanced transport story, with the
storage with the battery being that missing link that
gets -- brings them together.

So there is some value in companies that are
fully exposed to energy markets that are sometimes,
you know, maybe not too exposed through renewable
energy markets, but with the potential of
increasingly getting exposed through renewable energy markets, one need also to understand what could happen on the transportation side from a storage point of view. So I think those are the two key pieces that we offer them.

MR. OLSON: And Derek, you have a --

MR. JONES: Sure. And so thinking about data sources, you know, certainly it has been a challenge over time in terms of projections due to the, you know, protective nature of vehicle adoption, of registrations. So that's certainly a cost to our public utility colleagues to absorb.

But there is -- it is a robust supply chain. So in terms of leveraging what's public versus what is going to be private, I think there will need to be a reliance on folks who are plugged into that, pun intended, supply chain to be able to understand where things are moving.

As I mentioned, one challenge again is understanding where OEMs are going with their roll-outs, what types of models they're rolling out. They don't have the public facing or rather the market facing Staff to be able to continue to provide that data.

We have seen a strong request from utilities
for that. So I think there is a key opportunity there and that's something that we've engaged both communities about, to be able to provide. So I think that is one key piece, a, that we're working on helping to facilitate, a connection between the OEMs and the state governments and commissions, and how that can be a little more turnkey going forward.

MR. OLSON: I want to just followup on, Commissioner Peterson raised a question earlier about business models related to financing, and wondered if in your observations of the electric vehicle industry growth what you're seeing as business models that might develop and be sustained regarding the private flow of capital for the electric vehicle charging, if you have a comment. And I think we have -- that's about it for our last question.

MR. ZAMORANO: I already addressed it. So I don't really have more.

MR. JONES: So in terms of financing models for private capital flow, you know, typically in these scenarios with POUs we've advised, you know, whether it is -- some of their more traditional avenues, like bond revenue or putting up city bonds through votes and partnering with cities, but also, private partner financing.
That sort of three P model I think is a potential. There is a certain degree of risk that's led to the hesitation up until now with the sunk costs of DCFC, for example, but I haven't seen that three P model explored in too much detail when thinking about infrastructure, and so that would certainly be an area to look at without any particular active planning.

MR. OLSON: Okay. Thank you very much. I think we're at the end point of our time slot here. Just one other. Hopefully, gentlemen, you're willing to provide some of your data, not only your PowerPoints, but some of your background information for our docket here. That would be very helpful if you're willing to do that. And back to you, Commissioners.

CHAIRMAN WEISENMILLER: Are there --

MS. RAITT: Okay. So I think we're ready to take a break, and we'll be back at 1:00 o'clock. And just a reminder, public comment at the end of the day. So if you wanted to make comments go ahead and fill out a blue card and give it to me, but we'll be back at 1:00.

(Off the record at 12:02 p.m.)

(On the record at 1:04 p.m.)
COMMISSIONER SCOTT: Just as a reminder, the blue cards look like this. They're on the table out front. So if you'd like to make a comment, please be sure to fill out one and hand it to Heather, as she just said, and that's how we'll know that you're wanting to make a comment when we get to that portion of our Workshop. Okay. Thanks. Go ahead Noel.

MS. RAITT: So we have a series of panels this afternoon. The first one is on Planning and Interconnecting Loads from High Power Charging, and Noel Crisostomo is going to be our moderator.

MR. CRISOSTOMO: Thanks, everyone. Welcome back from lunch. So our panel today is smaller than originally intended, but we were hoping to gather stakeholders who are leading the charge, pun intended, in getting our vehicles charged much faster.

Originally, we had in addition to Dave Packard from ChargePoint and Tom Ashley from Greenlots, Terry O'Day, from EVGo, and potentially, Wayne Killen, from Electrify America. Obviously, in the past several months we've seen very quick progression of technology, both models of electric vehicles being announced, but also chargers.

So I'll go over just a few of the really key
aspects of this technology evolution since December in setting the stage for Dave's presentation and then Tom's. So in December EVGo broke ground on the first 350 kilowatt installation in Baker, which is on the way from Southern California to Las Vegas to enable those interstate trips at a rate seven times as fast as the existing EVGo fleet.

Just a few weeks later in January at the Consumer Electronics Show ChargePoint unveiled a liquid cooled connector capable of 400 KW charging. In February there's two important research events. Greenlots was awarded an Electric Program Investment Charge, grant funding opportunity for DC fast charge based vehicle grid integration to improve the economics of fast charging.

And EVGo unveiled in Fremont a 150 KW station intended to test the prototype vehicles that would accept higher rates of charge. In March, Electrify America, VW's subsidiary established under the settlement, set off a plan to set up a nationwide fast charging network capable of more than 150 KW capacity with plans to establish 350 KW chargers for interregional travel.

And then in April, just last week, EVGo's consultants, Rocky Mountain Institute released a
report on fleet and tariff analysis of the design of rates that are being proposed by the investor-owned utilities to facilitate DC fast charging that is more economic.

And so just in the past quarter there's been a large amount of progress in the industry. We'd like to understand how the POUs can account for this advanced technology and bring these new loads expeditiously online and learn from the experts.

So Dave Package from ChargePoint, welcome.

MR. PACKARD: Thank you. How we running that.

MR. CRISOSTOMO: Just say, next slide to Heather.

MR. PACKARD: Okay. So I'm Dave Packard with ChargePoint.

COMMISSIONER SCOTT: And let me make sure the mic's on.

MR. PACKARD: We're the high tech company. I live in the -- it's in the Bay Area and I can't run a mic. So anyways, I'm Dave Packard. We can go right to the next slide. You know, and I'm just going to -- a shameless plug for ChargePoint and then talk about DC fast charging and our new product, and then wrap up with a little discussion about demand
But you know, when I joined ChargePoint three years ago they had one product, and since then we have a product for all aspects of the market, home, workplace, around town and then corridor charging. We've developed products for all those. And it just, you know, it's -- I'm bragging about ChargePoint, but also, it's how fast the industry's moving. I think our competitors in the market are moving just as fast coming out with new products, new technology to make, you know, to make drivers more comfortable, make side hosts more comfortable, and to integrate into the grid to make sure that EVs are the best thing that happened to utilities and not the worst thing that happened.

And when you see some of the load curves of residential charging coming on and hitting right on peak you can see how quickly they could become the worst thing that ever happened. Next slide, please.

This is our network. This deck is a little bit old. We're up to 34,000 ports, but it happens quickly. And our DC corridors on the east and west coast, I live in South Georgia and I'm just proud to say that we have a corridor going by my house.

And most of the west coast is taken, but...
there's a lot of work to be done, you know. And there's Electrify America and a lot of utility programs and everything else coming on board, but we just have a tremendous amount of work to do to get to a point where we think that the electric vehicles can become mainstream.

Next slide, please. So when we look at what we're doing in the marketplace, currently, over the last eight years we know what we're dealing with. I mean, most of the battery packs are at 400 volts, about 50 -- I mean, they're smaller packs.

You know, the max they take is 50 kilowatts. We're dealing with three standards right now. Tesla does their own thing, and then CHAdeMO and the SAE, and we have to accommodate all that. and most of the vehicles that are charging on DC fast charging are BEVs.

But when we look to the future it gets a little scary for a manufacturer and probably a lot scary for a utility. These cars are -- the battery packs up to 800 volts, nominal, can take up to 350 kilowatts of power.

And when you think about charging hubs with, you know, four, five, six charging stations, that gets very scary, very quickly. And so you know, how
do we manage all this load? And you know, we have to make sure that as we do that we take care of all the vehicles, and we also take care of all the legacy vehicles to insure that nobody's left in the dust, so to speak, because this market has to build on its reputation and credibility moving forward. And we can't ever have anyone thinking that they've been left behind.

And finally, some BEVs are starting to charge on DE fast chargers. I don't know how many people drive the, but I drive a Volt, and that motor coming on is the worst sound you can imagine. I mean, it really -- you talk about range anxiety. They call it gas anxiety and it just drives you crazy that that motor comes on. So I'm really glad to see that I can get a plug-in hybrid with DC fast charge. But anyway, so going forward, charging infrastructure is going to have to be flexible and scalable and accommodate, you know, limited power availability from the utilities.

Next slide, please. Not to get too much in the weed in technology, but one of the things that we look at as we examine how cars charge is that they all have different rates. But one of the things true that most of them drop off after hitting a peak very
quickly in the charge cycle.

So you know, and we've seen this back in the '90s, the same thing with lead acid batteries. They go up to a peak and then the charge rate starts dropping off. So as we develop charging station hubs how do we take advantage of this.

And it's by knowing this we can start balancing the power throughout the whole hub and make sure that, you know, we're never designing it to deliver 350 kilowatts times four charging stations, if that's what you have.

You know, you'll throttle that back a bit, knowing that most cars are going to hit a peak and then drop off very quickly, and we can take advantage of that and provide peaks to other vehicles. And so you know, in instances you'll get the fastest charge, but for the most part, actually, you'll always probably get the fastest charge, but from time to time, you may, you know, take a little hit on timing, but just for the -- to facilitate the whole experience.

Next slide, please. So if we look at a product like this, a development like this, as we go into developing charging hubs, let's say this one has four charging stations. Say it's at 350 kilowatts
max, and a 350 kilowatt capable vehicle comes in, they can charge at the full rate.

Click, please. But then there's a second car comes in and the first car starts dropping off. Say that second car can charge at a full rate, and that's pretty much maxing out the facility. One more time, please, on this one.

And then we see other cars come in and they charge at a slower rate, but the whole load is balanced across the whole facility to insure that we get all the cars charged, everybody's happy, but in doing so we don't just demand too -- you know -- too much power from the utility going into the facility and we just, you know, calculate what's the nominal amount that we need to make sure that we have a proper driver experience.

And you know, and again, this is all about the driver. We want drivers happy. We want them to think they can get back on the road quickly, to know they can get back on the road quickly and charge their vehicles quickly. That's what this is all about; it's filling a need that the market feels we have to fill in order for electric vehicles to become mainstream.

Next slide, please. So one of the things
that we've had -- and I know this is a sore subject, Bill Boyce is looking at me, and SMUD's done some work on this. So that's a good thing. But when we look at demand charges it really is an impediment to the market of DC fast charging.

We want to deliver a product and have our customers be able to deliver charges to customers at a nominal rate, and if we look at the cost of gasoline maybe as an upper limit that we want to be able to charge people, and start looking at what demand charges can do to the economic of a charging station early on, it gets -- you know -- it gets pretty critical really fast.

This graph is showing what it would -- the economics of a station that's fully subsidized, installation, hardware, operation and maintenance is fully subsidized. And you can see at best you have -- with Georgia Power's demand charges you need about 20 customers per day.

And we go to San Diego we're up to about 80 customers coming through per day at that facility. And you know, it's all because we have to balance that demand charge over a number of customers. And we're not saying demand charges are bad.

We understand why they're there, but let's
look at them and see how we can moderate them for the industry so the industry can get going, because once we have 80 customers a day we can justify and pay for the demand charges.

Next one, please. And here are just some other curves and you see it gets worse and worse. And this one is just the -- I think the installation is paid for and the owner pays for the hardware and the operations and maintenance.

And next slide, please. In here I think it's 120 a day you need to pass through if you're going to pay for the hardware, the make ready and the installation and the operations and maintenance of the whole unit. So you can see that demand charges have a drastic effect on the economics of DC fast charge stations.

Next slide, please. So one of the things you want to look at is onsite storage. There's a lot of talk about help and some of the storage people that are here will probably strangle me afterwards. But as we look at onsite -- if you'd hit the next slide, and one more time.

So we look at today when we have smaller battery packs and intermittent usage and customers coming in and charging. There's plenty of time in
between the charges to replenish the battery, but
unless we're going to go for massive batteries that
will, you know, can provide for that charging station
through most of the day we run into real problems
when you look at the bottom, with the new size of the
batteries, like the Bolt, now they're coming out, you
know, with much bigger batteries.

They're going to charge for much longer. We
start seeing that we're going to knock out the
capability of the battery and its effectiveness to
offset a lot of the demand charges or even time of
use rates during the day.

Next slide, please. So one of the things --
that's good -- ChargePoint, we're really focused on
the driver, and I think most of the market is because
it is all about the driver. We really have to have a
great driver experience to get more drivers.

You know, if we get a lot more drivers I'm
happy, Tom's happy, Noel's happy, everybody's happy.
So that's what we're after. So how do we get there?
So until adoption rates are high, the return on
investment for DC fast charge stations is very
difficult to show the economics.

You know, will drivers have the appetite to
pay a premium. And we don't know what that premium
is. And the problem is, one of the advantages of electric vehicles, as we all know, is you leave home with a full tank of gas.

And now, we're trying to build a model around a gas station model where now people are filling up in the wild with a DC fast charger, which is different than the economics of what we looked at originally for charging, which was at home, in a workplace and maybe at the mall.

So now, how much are people willing to buy? And you know, we use the price of gas as a bar and we think that's correct, and hopefully, people will be willing to pay up to that amount for the emergency charge.

But basically, I would say today people think it's gouging if you're charging more than the price of gasoline, even though you're providing a tremendous value with a DC fast charge station. But you know, what -- so when we look at some of the programs the utilities are doing, some of the IOUs, there's some great programs and hubs that are being established.

I think Southern Cal Edison has one proposed, maybe I can't talk about this, but yeah. Just having hubs around, you know, a large
concentration of multi-dwelling units. So perhaps we start looking at that gas station model.

And the combination of perhaps fast charging and workplace provides a solution for people that can't get charging at their residence. So now, you're not charging at home. You're not leaving home with a full tank of gas, but you're leaving work with a full tank of gas.

And maybe the -- you know -- maybe we work in the opposite direction, but these things are things we have to study, that these pilots are going to be great to help us figure this out and go forward.

And then finally, just, you know, we have to look at the other recovery mechanisms. And I think one of the thing we've done today in the market for L2 delivery is that we look for other ways why people want to put charging in.

We have workplaces putting it in to retain employees, to keep employees happy. We have retail shops putting them in to attract customers. We have -- you know -- the list goes on and on of the different people putting them in, and the reason is they're using marketing dollars.

And then we have to really take advantage of
those marketing dollars to expedite more charging
going in all over the service territories. Next slide, please. So now, you know, this is half shameless plug, half about the industry.

But this is the product ChargePoint introduced at the CES show, and it's -- you know -- we took great strides to design a product that's scalable and it stays with the -- scalable and you have no risk of stranded assets, because the product can grow on itself.

You know, the design is, you know, we feel future proofed, allowing scalability, liquid cooled connectors so we can go up to 400 kilowatts and not have a cable that's so heavy that nobody can lift it. It's a modular design that allows for scalability, and also flexibility in your installation. And it has the displays needed so people can tell what's going on.

Next slide, please. So basically, the way that the unit's designed, on the left you can put in one charging station and then each station can hold two modules, and each module charges at about 31.25, about the size of a very large briefcase.

So if you put in one station with 31.25 kilowatts, it can charge at that. If you want to
upgrade you can have another module installed, and these are designed so a technician can do it. You don't need an electrician to come out and install it.

So now, you can run that station at 62.5.

When you go to install your second station, our engineers call them conjoined twins and that's why we don't let engineers name things, but the two will work together.

So if you have one car pull up and charge at 125 kilowatts it'll draw the power from the other unit as long as nobody else is plugged in. So you can go -- and it'll balance it actively through the charging cycle.

So as that car drops off, another car plugs in, it will charge, as well. And this system is module all the way up to -- actually, you can get it to 1,000 kilowatts, which you know, sounds ridiculous for a passenger vehicle, but as we start looking at transit buses and we start looking at medium and heavy duty delivery, that becomes more important, that we be able to have that ability to charge these larger vehicles.

You know, to them it looks like a level two. It takes hours to charge even at these rates. Next slide, please. One of the concepts, and I think
everyone's kind of talked about this a little bit, but something that really kind of hit a nerve, we were working with some of the smart cities' applicants, and it was this charging hub concept. And I think we're seeing some of this come out now, and it's just -- you know -- it's something that I think we really need to spend some time and look at, because the capability of getting a whole lot of people driven by electric vehicles in a short amount of time, by -- you know -- by getting the TNCs, the Lyfts and the Ubers of the world to start getting people driving electric and making it so they are capable of driving electric and making it through a day, I have the Dave Packard survey of all the Uber drivers that I've been with and taxi drivers over the last couple of months, and that's a lot of them. They tell me they're about 200 miles a day pretty much across the board. I mean, I'm sure they have exceptional days where they go higher or lower, but pretty much you can guarantee 200 miles a day. And when you have a Chevy Volt and other vehicles coming out at, you know, a little over 200, you just have to make sure you can schedule them one time a day to be able to charge, to make sure they get it through the day comfortably.
So these stations can be scheduled. They can also be used for buses, can be used for heavy duty trucks. You know, with intelligent scheduling and with people like TNCs that know their schedule, know when they'll need a charge, we can start balancing this out to get the kind of usage we need out of these stations to, you know, offset the effects of demand charges, if you will. But it's also an intelligent way to use our assets.

Next slide, please. And just in summary, you know, we have a lot of different electric vehicles coming out, a lot of different capabilities. I mean, we're still testing this market and trying different things.

Battery prices are just -- you know, I've been in this industry as long as Bill Boyce, if you can believe it, 20 years, 25 years, and the batteries that we've gone through and the technology is just so far advanced it's unbelievable.

You know, I hear rumors of 80 kilowatt hour -- $80 per kilowatt hour lithium ion batteries in, you know, five to 10 years, and that just blows me away to think we could ever get there. And we know that we're going to get there, and you know, it's going to change the automotive industry completely.
But anyway, so the products we develop, the products Tom develops are going to have to be future-proof and have flexibility in order to accommodate these different vehicles that are coming on the market. You know, hopefully we can do something about demand charges.

Love to see that generated by the utilities, because they know what the needs and wants are of their industry and we'd love to work with them and get that done. And this deck is old and I have to apologize to some others in the room, but Pacific Power was the first one that really came out with a redesigned rate plan around demand charges.

SMUD has since come out with a proposal on a new rate and so has Southern Cal Edison. And you know, again, the more utilities will look at this, we can try different things and see what works, and work with the industry to make sure that, again, we just take care of all the needs and wants of both the providers and the industry. Thank you.

MR. CRISOSTOMO: And now for Tom Ashley from Greenlots.

MR. ASHLEY: Thanks, Noel. So I'm Tom Ashley from Greenlots, and I don't make products. My company does, but I definitely don't. Occasionally,
I make a little bit of policy. I was asked to present on our CEC GFO 16303 award, and I won't bother you with the title of it.

But you know, over the course of the next number of slides I really want to sort of present both a challenge and sort of how Greenlots takes a look at some of the challenges that the market faces to really offer technology solutions.

Next slide, please. So as Dave mentioned earlier, it is all about the drivers. And the mantra in the industry is happy drivers, happy site hosts. And so as much as possible, whether we're talking about specific software development or just operation in support of our clients, it's really to make sure that that driver is taking care of every time, all the time.

And with where we are in the industry in terms of being really at the front end of adoption and really having a fairly significant infrastructure deficit, that's not always the easiest thing to accomplish.

For those of you who are maybe less familiar with Greenlots, we are a technology company and we really focus on EV charging software and services, with a very strong focus on smart charging. And
smart charging means many different things. But for us we've really focused on basically a definition around future-proofing and developing interoperability, both through communications, as well as, you know, future-proofing and creating sort of an energy interoperability going forward, so that we're really focused on effectively minimizing the cost involved with deploying and operating charging infrastructure.

And we're able to, you know, really stay ahead of the market and help identify, again, creative solutions to sometimes technology barriers, sometimes behavioral barriers and sometimes business model barriers.

We have not yet deployed 34,000 charge ports. We are less than 10,000 and have really focused on scaling the robustness of our technology to meet sort of the growing scale of the industry. and so we've really split our focus, I would say fairly evenly, between supporting the deployment of DC fast charging, both nationally and internationally, and really developing that robustness of smart charging technology to deploy grid integrated charging, whether it be level two, DC or in some cases even level one.
Next slide. So as you've probably heard before and you'll probably hear many, many times again, with where we are with the scale of EV adoption, DC fast charging really is a difficult business proposition.

There are pretty significant costs associated with deploying this technology and this infrastructure from a capital standpoint. And there is at this stage in the market still very low utilization.

And yes, indeed, Dave is correct that scale maybe solves all. Where we're talking about moving forward, both with this technology concept, but really to improve the business model across the industry is to effectively solve utilization.

Increasingly, site hosts are having more and more difficulty with demand charges, which in and of itself may not be fully solved by higher utilization, but we definitely see a very strong correlation between rate design and utilization and hitting some inflection point at some unknown time, hopefully in the next couple years.

And then somewhere more of the subject of this panel, we really are seeing increasing power demands, both in terms of the power that's going to
an individual car and the power that's required at a site to support the deployment of multiple DC fast chargers or greater scale of AC level two.

Next slide, please. So the application that we submitted and that ultimately was successful had a number of goal elements. The first part really is to integrate within the context of one integrated platform, the management both of charging and storage.

And then within -- with that as a baseline, to effectively aggregate or in this context maybe simulate an aggregation of DC fast charging loads to help facilitate in this case we can call it site level, distribution system level or even larger grid level scale integration of DC fast charging, as well as supporting electric fleets.

You can go to the next slide. So I think we all understand the concept that co-locating some storage can help reduce demand charges. And if the only thing that you're focused on is reducing demand charges, co-located stationary storage is highly effective.

But if you are in fact interested in having a business model that is profitable, co-locating storage on its own as a solution for demand charge
reduction is not currently a winning proposition.

Even here in California, where we support the deployment of storage really unlike anywhere else in the country, if you are lucky enough to sort of be granted an SGIP, you know, incentive, deploying storage even with SGIP to reduce demand charges still is not a winning business proposition for the most part.

And so the question is, you know, what other value streams do we need to identify to start turning the tide and make that a winning business proposition. If you can go ahead to the next slide.

So I apologize for the size of some of this font, but basically, this is demonstrating or visualizing over a few day period the utilization of a single DC fast charger in urban Los Angeles.

And what you should take away from this slide more than anything else is that utilization varies significantly, and it's very difficult to predict when something is going to be utilized, even if you are sending out price signals.

And so effectively, if you're a site host, an owner/operator of this charging location, there's very little you can do outside of a technology solution to really offer anymore certainty of what
you're going to be looking at from an energy cost standpoint or what your ceiling might look like from an energy cost standpoint.

And as you can see, there are large portions of these time periods where there is no utilization or very low utilization. Next slide. So while there's still some pretty significant spikes here, this is an illustration during a fairly similar time period of multiple DC fast charge locations, so multiple stations, multiple sites.

And while again there is significant spikiness, there is starting to -- it's starting to balance out a little bit more. They're starting to see some patterns are starting to emerge. And so effectively, just like the distribution system as a whole, we felt that to reduce the cost of owning and operating a DC fast charger or a set of DC fast chargers, we needed to be able to find a way to increase the utilization and effectively increase the load factor.

And so I will -- I'll say next slide, please. Thank you. So this is a day, a day in the life, and as you can see this, again, is multiple DC fast chargers. And right in the middle of this is the -- we'll call it the belly of the duck.
And as you can see, based on, again, utilization across these fast chargers in urban Los Angeles over a random period, about a week and a half ago, this is what it looked like. So the charging is happening basically at times when maybe we'd prefer or the system operator would prefer that it not be happening, or indeed, it's not happening at times when the system operator would prefer that it did happen.

And so beyond backing up, you know, these charges with stationary storage, we felt that we really needed to find a way to increase that utilization and spread out the variance of the utilization to something that's a little more predictable.

And as we're moving forward, you know, in Los Angeles we work very closely with the city to support their EV fleet adoption and deployment. And increasingly, we all know that TNCs and any number of other fleet operators are moving towards Transportation Electrification.

And so for this project we really focus on identifying various price signals and communication methodologies to increase the load factor, and in this case, make sure that the belly of the duck is
being addressed from a charging standpoint.

And indeed, the hope is that by doing that, not only are we, you know, raising the belly, as it were, but we are also, you know, lowering the neck or, as we like to say, encouraging the duck to bow down.

(Laughter)

If you can go to the next slide. Again, I realize it's a little small for you in the room, but this is the rough architecture of this solution. So on the left slide there are four DC fast chargers.

Thank you.

And while we are going to locate these all in one location, we are going to pretend that they are in four different locations. And so we are effectively going to be simulating an aggregation of these DC fast chargers, but with the sort of cost efficient standpoint of having co-located battery storage, site controller and, you know, transformer and electrical service.

We are then going to be -- on the right side is the communications layer and the software side, which really speaks to the communications that are happening between different stakeholders. So you can see the line connecting these two sides, that's OCCP,
which is the open charge point protocol, which we've really built our communications between software and hardware around for the last number of years.

And increasingly, OCCP is able to take more and more sophisticated energy signaling. And so we really find that OCCP is able to handle and indeed, the continued development of OCCP, is able to handle pretty much everything that we want to throw at it.

And then we have the communication between our software platform and the utility. In this case it looks like it's going to be Southern California Edison, and that's happening primarily through Open ADR 2.0, but there are multiple methodologies that can be supported.

And then we're also going to be communicating, both to drivers individually, but also fleet managers and the operators of all electric fleets. So I'll end there and look forward to answering questions.

MR. CRISOSTOMO: Thank you both for great presentations. I saw one slide that I thought captured a commonality for slide three from Tom, noting high infrastructure and installation costs, low utilization, high demand charges and increasing power demands.
That leads me to one question link. How can we synthesize those new fundamentals in the way that you're designing your charging systems into a request for the utilities as to how they can accommodate a streamlined interconnection?

Or I guess conversely for the POUs, how can -- what would the best experience be for you in interfacing with a new project?

MR. ASHLEY: I'll start. Thanks, Noel. So while, you know, this is -- there's a limit to what is possible, even with the best technology in the market, we do want to communicate that as much as possible we want to recommend, basically, a software heavy and an infrastructure light approach.

So whether you think about it as cost minimization or an increasing value or access to value streams, it's the software that can unlock a lot of that. And whether you sort of take the example of, say, deploying four AC level two charge stations on electrical service that can only support two of them, providing full power simultaneously, you know, you're able to effectively charge more vehicles per dollar by tapping into the power of software technology.

I think that, you know, I don't want to say
that's a copout, because we feel very strongly about it, but as we're moving forward, especially with more and more installations at higher and higher powers, it's really a question of how do you right size.

And that's a balance, while we've talked about sort of different solutions to supporting more power or power balancing, it's still a question of, you know, how much service do you run in the first place to support that site.

And I think that that's where we need to get, is a better understanding of what our strategies are for right-sizing, whether you want to call that future-proofing or something a little bit different.

MR. PACKARD: Yeah. I guess I'd just say that for utilities looking at programs, look at it from the driver's standpoint. And we all have our own concerns in what we need, but above all, the driver needs to feel comfortable they can get what they want.

And possibly even look at the whole market as a holistic being and not worry about, you know, and this may be a way -- I know some of the utilities are looking at a way to justify some wavering on demand charges.

But if we look at home charging, we look at
some grid services as far as demand response and, you
know, voltage regulation, frequency regulation, can
we take some of those advantages out of the market
and put those, kind of pool those and say, this is
the overall advantage we're getting to the grid from
electric vehicles.

So we ought to be able to waive demand
charges. I don't know. It's just a different way of
thinking about things, that maybe there are other
ways. I just get a little worried when we start
talking about a lot of control over DC fast charge
stations, because you know, how would it disrupt your
day if you went to the gas station also and you
realized it was going to take 45 minutes and not five
minutes to fill up your car.

It starts ruining the driver experience, and
I think that's something that we really have to make
sure that we're cognizant of. And you know, there's
so many things we have to do it's just unfortunate,
we have to do it.

But let's make sure if we are doing it, if
we're affecting the driver experience, that we do it
with our eyes wide open and know the impacts of that
on the industry.

MR. CRISOSTOMO: Well, I have a ton of
questions, but I also want to defer to Commissioner Scott or Commissioner Peterman.

COMMISSIONER SCOTT: I did have one question for you, Tom, on your slide with the renewables integration with dispatchable charging, which was number eight. And I thought that was really interesting to kind of take a look at when people are using the DC fast chargers, and it's sort of at exactly the times where we would not want them to be using DC fast chargers, at least in southern California during that one week.

Do you have a sense of what it looks like in other parts of California in other times of the year? Or is this kind of our first snapshot into that?

MR. ASHLEY: Well, I will just say that I don't know that this is necessarily, you know, illustrative of any particular geography, you know, over any time frame. This was, you know, a couple weeks ago, random L.A.

but I do believe and I can have my team followup with you on the data side, but I do believe that this is a roughly accurate illustration of what we're seeing in certain types of deployments; again, use cases very significantly for when and how people are accessing this charging infrastructure.
But this is obviously a fairly concerning trend or possibility, and I think that what I would encourage is, you know, we've been talking about time of use rates for quite a while to, you know, help fill in, say, overnight charging or something else. And certain utilities are looking at much more dynamic versions of effectively time of use or day ahead pricing signals. And we are not thinking — we have not been thinking for the most part about time of use rates or signals for DC fast charging, because inherently, as Dave very, you know, importantly mentioned, you know, this is how we get around. These are gas stations for cars going forward.

And so there is going to be an absolute inelastic demand for a lot of drivers for this type of charging. So it's really focusing on the types of vehicles, the types of drivers that have more of an elastic demand.

COMMISSIONER SCOTT: Commissioner Peterman, did you -- okay.

MR. ASHLEY: All right. Well, thank you, Tom, and thank you, Dave. And I'll call up the POU representatives for our next panel.

COMMISSIONER SCOTT: For those listening in
on the WebEx, give us just a minute. We're bringing up the new panel and getting everything in order for them to start. While they're organizing themselves, I'll remind folks, if you would like to make a comment please fill out a blue card. They're on the table up front.

Make sure you get it to Heather, who's over there behind the podium. She'll get it up to me and that's how I'll know that you want to make a comment when we get to that portion of our web -- web page -- of our Workshop.

MR. CRISOSTOMO: Thanks Commissioner Scott. Sorry for the little delay, everyone. We're changing the order just a little bit, but I realize that it won't affect the IEPR team too much, because we only have one presentation that we're -- or two presentations that we're looking at visually.

So I'll introduce our panel of publicly owned utility representatives. So we're welcoming here to help plan for the electrification in your grids. And I'll set off, everyone has 10-minute presentations with just this broad prompt for everyone in the audience.

We ask the POUs to respond to the Draft Transportation Electrification Guidance, and this
concept of how we can work together to gather
information and develop the capacity in planning and
deploying electric transportation.

Second, we wanted to learn the latest about
what your members and your utilities are doing to
plan for EV load as a resource in the grid since we
last met you guys in October, and third, to proffer
ideas of how the Energy Commission can be helpful in
meeting our shared Transportation Electrification
goals.

And so in the interest of queueing everyone
up per your request, we'll have Barry Moline from the
CMUA, Municipal Utilities Association, then followed
by Nancy Sutley of Los Angeles Department of Water
and Power.

Third, Bill Boyce from Sacramento Municipal
Utility District, fourth, Kapil Kulkarni, from
Burbank Water and Power, followed by Jonathan
Changus, from the Northern California Public Power
Authority, and Bryan Cope, from the Southern
California Public Power Association. Barry, please
lead off.

MR. MOLINE: Thanks, Noel. Noel,
Commissioner Scott, I'm Barry Moline, with California
Municipal Utilities Association, and want to tell you
clearly that the POU community supports, strongly supports increasing Transportation Electrification. And like the previous panelists, I drive a Chevy, an EV, and I've had a positive experience. So I walk around telling people all about it. We recognize this opportunity as a way to increase services to our communities, one that has the ability to reduce emissions and greenhouse gases.

And we also need to recognize that there's a customer perspective that we need to focus on, because customers are ultimately the ones that must make the purchase decisions for an electric vehicle. And for example, a city or utility can control the investment that we make in electric transportation, such as buses or vehicle fleets, but that's our choice based on budgets and available capital and local interest.

But creating a consumer market, as we know in light duty vehicles, is a whole other matter. We recognize that now we're sort of getting into an engagement like we're Starbucks. We're trying to create a new latte drink and we're trying to get people to try it and then to ultimately buy it, create demand for it.

Or we're like Apple versus Samsung, trying
to present to the public a reason why they should choose one over the other. So we don't control consumer behavior, but we'd like to transform that market, and we also need to move carefully because we are investing the public's money in this endeavor.

Many POUs have or are developing innovative programs to provide charging infrastructure, incentives and rate structures to encourage Transportation Electrification. And in each community there's a different customer makeup, different needs, different preferences, different infrastructure and other unique factors.

And as a result, POUs need to tailor their programs to fit their local communities. So a program that is successful in one community may not be successful in another community. And a driving factor in the way -- that was not meant to be a joke, but what the heck.

A driving factor in the ways that POUs think and move is to share best practices, and learning as much as we can from each other. And there's an important reason why, and that's because our governing boards are elected officials, and they are accountable and responsible to our local communities and to the public.
They feel the urge to be leaders and invest in new efforts like electric transportation, but as you know, they're stewards of the public's funds, and as a result they have a strong desire and urge to invest wisely.

And that's why our governing boards like to know that the investment they are making in new infrastructure will achieve its intended goal and have a positive, because the corollary is that they make a bad investment, they look bad, they're on the front page of the paper and then they're not elected.

So that's the balance that we live with and sharing best practices helps us make those wise choices and avoid a wasted investment. So while we're actively promoting Transportation Electrification we also have to recognize that it's still in the early phases.

And while we believe the primary focus of expansion should be on doing what it takes to grow the number of EVs on the road, or I'm sorry, the primary focus should be to grow the number of EVs on the road, we believe that all other goals should be viewed secondarily.

And we think that they're valued goals, to look at the integration with the electric utility,
but number one is getting more EVs on the road. So that way we can transform that market. So regarding data collection, we also see the need for greater data.

And we'd like to insure that the collection of this data is not duplicative or overly burdensome and that it is -- the data we're collecting is targeted toward growing the market. We don't want to be over-burdening consumers.

One key role that the CEC can provide is collaborating with the ARB and the CPUC to develop common metrics and technologies that estimate the use of electricity from EVs, and in particularly, the CEC can work with ARB to develop the methodology for estimating the amount of EV load that a utility has without requesting unrealistic and specific metering for each vehicle. So thank you. We appreciate the opportunity to work with you on this important issue.

MR. CRISOSTOMO: Thanks, Barry. And next to Nancy.

MS. SUTLEY: Thank you very much, and thanks for having us here. We appreciate the opportunity to talk about LADWP's investments in supporting Transportation Electrification, and we believe that Transportation Electrification clearly is key to
meeting the state's greenhouse gas emission reduction goals, and certainly, our local air quality standards in the south coast basin.

We have a long history of investing in EV charging infrastructure, as does the City of Los Angeles, and there are aggressive goals around electrification throughout the city's Sustainability Plan, which goes through 2035.

LADWP prepares an Integrated Resources Plan and our 2016 IRP update, the goals in the IRP update were around environmental stewardship, around reliability and competitive rates, and this looks out 20 years.

And included in our strategies to meet our greenhouse gas emission reduction goals are early coal replacement, higher levels of renewable portfolio standard investments in energy efficiency, local, solar, energy storage and investments in Transportation Electrification.

And in our recommended IRP case at 2036 it includes a 65 percent RPS, a 15 percent energy efficiency, which is slated to achieve by 2020, 1500 megawatts of local solar, 400 megawatts of energy storage and high levels of electrification, the equivalent of 580,000 electric vehicles in Los
Angeles by 2030.

And in looking at our -- looking at the IRP, one of the things that we did was to evaluate the relative greenhouse gas emission reduction costs among the IRP cases, and among the strategies. And the most cost-effective between the base case and the recommended case, the most cost-effective way was to increase from the base level of EVs to a higher level of EVs.

So the incremental costs of those greenhouse gas emission reductions associated with going from a base case EVs, about half of what was in the recommended case, to the recommended case it was the lowest by literally orders of magnitude.

So these are, in terms of greenhouse gas emission reductions, increasing our investments in Transportation Electrification, is remarkably cost-effective. And so we believe that it's time for the State of California to recognize those greenhouse gas emission reduction benefits of investment in EV charger and to find ways to support that through incentives for charging infrastructure or other methods supporting that.

So to get to DWP's program, we're spending about $21 million through 2018 in our Charge Up L.A.
Program, which was approved by our Board last year, 2016, with the goal of reaching the equivalent of 145,000 plug-in vehicles by 2021, to increase vehicle purchases and to emphasize public and workplace charging in our plans.

And the Charge Up L.A. Plan has six parts around education and outreach, which has already been spoken to a little bit. Through the city fleets, in the sustainability plan 50 percent of new light duty city fleet vehicles will be battery electrics, and 100 percent of our new light duty vehicles will be plug-ins.

And you may have heard about LAPD, our police department has purchased is the largest fleet of non-pursuit electric vehicles and is demonstrating a pursuit vehicle. In this -- we have invested and we continue to invest in city infrastructure, in public charging, in city fleet charging and in rebates for workplace charging.

We have 187 public chargers on city facilities thanks to a CEC grant, including at our zoo and the libraries around the city to insure that we are reaching all parts of the city. Our bureau streetlights is demonstrating light pole chargers, with plans to install more than 30 of them.
We've done a couple of utility pole charger demonstrations and 16 fast chargers near our freeway interchanges as part of a DOE Smart Grid Grant. In terms of rebates, we provide up to $500 for a level two charger for residential chargers, as well as an EV rate for our residential customers that have a separate meter, and up to $4,000 for level two EV chargers in public, workplace -- for commercial, public, workplace and multi-unit dwellings.

And the areas around medium and heavy duty trucks we're working closely with the Port of L.A., with the airports, with LAWA and with the MTA and our own DOT in terms of supporting their conversion of certain parts of their fleet to electric vehicles.

So we're doing a lot. We want to do more. So we're working on some plans to expand our programs. Our model is not to own the chargers, and we also have strong city policies to support increased electrification across what the city can do.

We recognize we need to move faster. We are taking advantage of every dollar that we can find to support this charging infrastructure. We participate in the LCSF Credit Program. We're trying to sell some right now.
We've generated, throughout the history of the program, more than 70,000 LCFS credits, and have plans of what we can do with the money once we're able to sell those credits and look at it for an opportunity to fill in some of the gaps, to close some of the gaps in our Charge Up L.A. Program.

And again, that's still not enough to move quickly, and we really believe that there has to be a way to find some incentives through the greenhouse gas emission reduction programs to support the level of EV charging infrastructure that we need. Thank you.

MR. CRISOSTOMO: Bill.

MR. BOYCE: Good afternoon. I think I do have a presentation, so if they could spool it up that would be good. All right. Thank you. Go ahead and go onto the next slide. I can see it from there, too. Thanks, Barry.

Just kind of give you a quick status of where we're at as an organization at SMUD with regards to the light duty, our plans are pretty well set going forward. We've essentially been really incorporating Transportation Electrification load into everything we do on resource planning since about 2012.
So our market projections, you'll see those in a second, we're updating those right now, kind of given the new Scoping Plan. New customer programs launched this year. Actually, also some new elements, though, the Scoping Plan.

We're also going to be looking at program adoption effectiveness, and then lastly, new projections for the ultra fast charging stations coming up. Also, internally, in support of all the SB 350, we've got quite a IRP scenario planning going forward, which includes Transportation Electrification scenarios into all of that.

Next chart. This really shows what marketed option we're looking at. What we typically do is we take the state numbers and we divide it by our population percentage. We're four percent of the state's population, and that breaks down to where we're at.

We think the natural market by 2030 if we don't do anything will end up being around 44,000 vehicles. But to reach the latest Scoping Plan, and I'm looking at Jonathan behind me and that's why, that number up there is around 162,000, corresponds to about 4.2 million vehicles in the state.

Right now, our program spending is
attempting to get us up to that current target level.

Next chart, please. So comments that we had with
regards to the Guidelines kind of feed back to Staff.
Concurrence with the Guidelines, we think that
related growth and expected low profiles, we have a
lot of those in place.

Emission estimates are all consistent with
what we've already been doing at SMUD. Also, the
request for what we're doing to invest to support the
market, we already have all that information, very
consistent with what we have ongoing, and then
identification of how to get disadvantaged community
members engaged and looking at different target
groups.

One thing we did not see in the --
basically, the guidelines that we think you might
want to take a look at is, really, also trying to
track what sort of grid impacts TE are causing the
individual utilities, and really trying to get a
handle on costs.

We keep talking about, you know, what are
the program things that we can do to get people to
buy the cars, but let's recognize that some of this
will also cause grid impacts and we ought to be
tracking that for cost-benefit analysis, and also to
get a handle on what sort of rate impacts that could cause.

I've got a chart later on. Our new 2017 initiative is next on the chart, please. We've actually launched a whole bunch of stuff. We've had quite an ad campaign. If you've been in Sacramento you've seen ads, probably in the last month and a half, but we've upped our incentive level.

Last year in 2016 it was $300 a vehicle. This year it's 599. We actually market that as free fuel for two years, getting quite a bit of uptake on that. We've doubled our advertising and outreach awareness campaign. We've launched full workplace charging.

We've launched DC fast charger incentive pilots. So this is where we've moved away from a SMUD owned and operated to a private sector. Working with regards to some community school bus efforts, and I've got more information on that.

That's in partnership with other regional entities and getting funding from ARB. Fleet workplace, more on the R&D, taking a look at fleet assessment tools, more managed charging research, and then also taking a look at medium fuel, heavy duty fuel switching or things like truck refrigeration.
units, and we'll be looking at forklifts later this year.

Next chart, please. So looking at disadvantaged community, there was a request to see what we were doing. The SMAQMD and SHR is Sacramento Housing and Redevelopment Agency, working with them on a share car deployment project at the Housing Redevelopment Association properties. That is CARB Grant supported and that's really trying to get shares cars into some of those facilities.

I already kind of mentioned the school bus effort, but that's also with the Air Quality Management District, working with three different school districts in Sacramento. Really, what we're bringing to the party is the charge infrastructure scope to support that.

And then lastly, our own fleet is also located in a disadvantaged community area itself off of South Bradshaw, and we've got fleet electrification expansion plans going forward. Multi-family dwelling, EVSC Incentive Program, we're also hoping to get more of that into the disadvantaged community area.

We're seeing actually more uptake in that in new construction type activities and just retrofits.
Okay. Two more real charts to go. What are we doing for private and service providers? We have developed a sale for resale policy.

I'll just put in a plug for LADWP. I think we plagiarized their policy really well. So they did some great groundbreaking work there. Give Nancy and her team credit. Dave Packard alluded to this. We've actually had a commercial EV pilot rate without a demand charge since 2015.

That really is a flat rate. If you were to think about how you would want to go to a gas station and buy electricity you would not want to see different times of day. You wouldn't want to see summertime versus wintertime rates.

You wouldn't want to see demand charges. So that rate was really basically designed to meet that need. For an aside, that's one of the things -- I'm headed off to the EWAB accelerator right after this, and people are interested in how we develop that rate for other types of applications.

And then lastly, going to an incentive model for workplace and DC fast charger, also directly support there. Next chart. This chart is actually one we have had for a long time, but I kind of wanted to underpin things like grid impacts, cost and the
things that we look at with regards to smart charging.

If you take a look at this graph it really, what we tried to do was look at our whole system of what it would take to upgrade it to handle different types of vehicle scenarios. And what this is, is this is if every single car charged at these levels off to the right, so if every single car in SMUD service territory charged at 6.6 kilowatts at 8:00 p.m., which is essentially on peak for us, it would cause that type of replacement rate of which we would -- if you look out there at the 164,000, that would be something like $35 million a year.

Likewise, if you go down, 3.3 kilowatts is less than 15, and then two kilowatt charging is in the five. So what it really tells you is charging level by far and away is much more of an impact than time of day.

The other one, though, that's there is we get into conversations with smart charging a lot, and taking a look at, okay, if you were to institute a smart charging system and I had to go to a smart network charger that had something like a $200 a year networking fee per vehicle, you can see how much that costs.
And so you know, I could afford to upgrade my whole grid for full peak charging, or pay for a managed charging fee. So I guess the emphasis for this is really, and one of my messages, that we really also need to work on very low cost, managed charging schemes.

If you look at the very bottom of that, if we were able to figure out how to smart charge at zero dollars per network fee and how do you do that, you can see that, you know, it gets you way down there.

But just managed charging in and of itself has to come with costs tied to it. We need to be cognizant of those costs and, really, how do we look at all those things going forward, because playing in markets like ancillary services, reg up, reg down, all that gets to be, you know, a cost driver.

So last chart. Resource planning since 2012, kind of like what Barry mentioned. Everything we're doing right now is really focused on increasing adoption. We also think there needs to be significantly more funding brought to infrastructure in the state.

When we look at the IOUs, their investment, we look at Electrify America's investment, we look at
the POU investment, we still see a gap. So we still see plenty of room for everybody. We need to do as much and more as possible.

LCFS funding, I think primarily in the POU world this is really important funding. We use it to support all those vehicle incentive programs and all that. If that type of funding goes away it's going to be very difficult to go back to our boards and, really, business cases will really have to be mutated quite a bit in order to support things.

And then lastly, carbon reduction. Going forward, this is one when we start looking at IRPs, and Nancy kind of also talked to this. You know, you can get a lot reduction of greenhouse gases through electrification than through some of the other utility, and really need to make sure that we don't cause problems on the utility side in order to cross-sector shift from the transportation oil sector.

That's all I have.

MR. CRISOSTOMO: Bill, a clarifying point.

Could you define the difference between smart charging, and then the all vehicles at 8:00 p.m.? Is the smart charging like dynamically valley filling or something?

MR. BOYCE: Smart charging, at least the way
we analyzed it for what we had, was being able to make sure that no charging was coincident to each other, they were sequentially back to back to back, and primarily at nighttime between midnight and 6:00 a.m.

The key thing is, no two vehicles charged at the same time. So it would be able to spread it out on any given transformer.

MR. CRISOSTOMO: Okay.

MR. BOYCE: So we really looked at it in a pretty granular fashion.

COMMISSIONER PETERMAN: So just a followup question on that, because I was going to ask about that, Bill. So then it doesn't take into account the transformer's capacity?

MR. BOYCE: It took account the transformer capacity, not only that, but what the transformer was loaded up to. So we took a look at how much capacity head room and then we would take a look at our impacts as cars attached to the grid, because if you look it's, you know, increasing more cars every year. You're going to cause more impacts every year.

But if you could spread it out across time, like I said, not have any two cars or three cars charging at the same time. So if you ever look at
our research and development, we're always looking at how can we potentially have cost mechanisms send out pricing signals, or other types of ways to sequence the cars so, once again, they're not charging on top of each other.

MR. CRISOSTOMO: And this is a 2030 figure?

MR. BOYCE: That is what we're projecting. It's not quite year to year. I had to fudge up an old chart in order to get it for you this quickly.

MR. CRISOSTOMO: All right.

MR. BOYCE: But it tries to quasi make it think about 2030.

MR. CRISOSTOMO: We appreciate that. Thank you. Any clarifying other points? Okay. Next, Kapil from BWP.

MR. KULKARNI: Commissioner Scott, Commissioner Peterman, Noel, thank you for the invitation to participate in this panel. Kapil Kulkarni, Burbank Water and Power. I'll be presenting on our Transportation Electrification effort so far.

Next slide. First, just an overview of what I'll talk about and how they address the Draft Guidelines. Going through each of the sectors that we work in currently, what we currently offer in
terms of incentives and how we plan to do the marketing portion, as well.

Next slide. first, a little bit about Burbank, Southern California based, about 10 miles northwest of downtown L.A. Population of 105,000 in 17 square miles. What we've done over the last couple years, we received a Smart Grid Grant from the Federal Government and were able to deploy full MI for both electric and water in the territory.

So the benefit from that is knowing, you know, what our load is in any given year on a 15-minute basis. We also as part of that installed our first public EV charters through a charge point in 2011, and then expanded the Public Charger Program with Greenlots and our curbside chargers of a CEC grant a couple years ago.

At the same time, we wanted to make sure that we were addressing other parts of the EV charging market. So we implemented time of use rates for residential customers and rebates for the purchase of electric vehicle chargers.

So that's been our public and residential program so far, but the thing that we need to address within the city, as you can tell by the map, are the employment sectors. You know, Burbank is a -- has a
vibrant commercial sector in terms of it's 75 percent of our total electric load, and it's a net I guess producer in terms of jobs and commuters.

We have a couple big studios, as well as production facilities, and this brings in more cars during the day than leave. So we have cars that are parked there throughout the day during the daytime, and it's -- you know -- because Burbank is still somewhat suburban, you need a car to get around the city. So there's a high potential for workplace charging.

Next slide. As you can see by this graph here, which is a little complicated to explain, but basically, this is actual load data. The orange graph, which is non-solar load, and the top blue graph, which is solar load, for November 2015, weekday.

So you can see the kind of gap between solar and non-solar resources, and this is mainly as a result of the RPS and one of our solar resources, Copper Mountain, which came online in the last couple years.

So that's a 40 megawatt difference that we need to absorb into our system, and we think that we can do that with the addition of workplace charging,
as represented by the middle line, which is non-solar plus EV load.

But when you -- so this is one possible solution for addressing the imbalance between solar and non-solar resources. But at the same time the bottom and top lines are real. The middle line is kind of a stylized version of workplace charging.

It's actual workplace charging data scaled up by a factor of about 20,000. So that's not going to be next year or the year after, but probably maybe 10, 15 years from now. And it's based on, say, an average of one kilowatt per vehicle, charging starting around 7:00 or 8:00 o'clock, and hopefully, not charging between our peak hours of 4:00 and 7:00 p.m.

So you know, we have some workplace charging data available from our internal Workplace Charging Program, but to acquire this data for the commercial companies and studios in Burbank there is a cost to get that data, because it's their customer data and it's behind their meter.

So we don't currently have any EV load that is separately metered. You know, we can look at our AMI system to figure out, you know, what might be occurring from charging, what might be occurring from
air-conditioning, but we have plans to hopefully
start a pilot program that will separately meter EVs
and provide level one workplace charging.

But you know, currently, you know, we have
as much data as you guys have from us, which is to
say, very little. So there's a cost to get this data
and we hope to work with our commercial customers to
help us inform what our program should look like, as
well as inform our IRP and work with the CEC on that.

Next slide. So that addressed Part B of the
Guidelines. The next slide is our current rate
design for commercial customers. Right as of January
1st, 2017, all of our commercial customers, which is
all -- or 75 percent of our load, is on a time of use
rate.

Fortunately for them, they haven't hit the
summer portion of it to where they'd be paying 26
cents between 4:00 and 7:00 on summer weekdays, but
it's something that we're working on in terms of more
marketing and outreach to make sure that they're not
surprised when they get their July bill with their
June usage.

So this addresses number two of the
Guidelines in terms of rate design to encourage
electrification and making sure that we can
incentivize charging, whether we want it off peak or mid-peak, as well as, you know, potentially super off peak.

And this kind of goes back to the points that Tom and David addressed in the previous panel, and Bill had mentioned with the flat rate. We do have a time of use rate on our own publicly-owned DC fast charger, but the time of use rate, which is 50 cents during those peak hours and 30 cents during non-peak hours, has not had an impact on usage of the charger.

Based on what other panelists have said, it's like a gas station, if you need to go somewhere, you're going to use it regardless. And that's also not very customer friendly in terms of in the winter they pay 17 cents during the non-peak hours and 30 cents in the peak hours.

So you know, it's not easy for us to change the rates of the charger every time the season changes, and it's not convenient for the customer to think about, oh, should I wait until, you know, after 7:00 to charge if I need to go somewhere now. So I think we'll look more into flat rates and making sure it's easier for the customer to pay for not only the demand charges, but also the kilowatt hour usage.
Next slide. So based on the graph, which showed the solar and non-solar resources, we plan to do a lot of efforts with our key accounts and other commercial customers, to meet with them, find out what needs they have for charging, what they're currently doing and see what options make sense.

You know, if there are other ways to roll it onto AQMD compliance or other benefits to employees, then we can do that without necessarily building the infrastructure for them or providing rebates that we'll have no way of tracking if the usage is behind the meter.

But if we can work on something that provides, say, a super off peak rate, provides level one charging and does it as a very minimal cost to where we can track a usage or shut it off, you know, during the peak times or during outage times, then that's something that we can develop a program that's tailored to those customers.

Next slide. For the non-commercial sector I think it's a little more straightforward in terms of, you know, time of use rates for residential charger rebates that are mandatory to go on the time of use rate, and also, thinking about other incentives.

There's a startup that I've heard about that
is kind of like Tinder or one of those apps where you can be matched with another charger in your neighborhood, so you don't have to install a charger and you can reserve a time to charge there.

For multi-family I think this is something that it is half of our residential customer base, but it's something that we haven't really been able to address, other than through curbside charging. Right now, we offer them a $1,000 rebate.

And I'll give you zero guesses as to how many applicants have applied for that, which is zero, basically, because it's hard for the landlord to justify putting that in at their expense when they're not sure if their tenants are going to use it.

At the same time, it may be in the thousands of dollars for a tenant to have a separate meter or outlet put into the garage for an EV charger. So definitely, more analysis is needed there. Next slide.

One thing that we have been able to do that addresses number four, outreach and education and coordination, and this just happened about 10 days ago. The picture is from an event that L.A. did using the same vendor, which I stole for this, but I wasn't able to get a picture of the actual event.
But it was two weekends ago at the Rose Bowl in Pasadena, jointly sponsored by Burbank, Glendale and Pasadena Water and Power through a SCPPA contract. So we were able to utilize Joint Power Authority resources and bring the benefits of three utilities working together to have 27 EVs on display and more than 490 guest drives.

And this type of event really brings home the fact that, you know, in our industry, you know, it's easy to tell -- to talk to each other about EVs and the benefits of them. Whereas, for people attending this event it may be the first time they've been exposed to it. So we need to do more of these, and we plan on doing it with the help of SCPPA.

The next one, just going through all of the different actors involved in, you know, vehicle data, charger data, rate data, operations data and planning data. And one thing I wanted to kind of address, my background's in energy efficiency.

Energy efficiency usually results in a lower than one RIM test. Whereas, if you're putting in chargers and adding vehicle load that results in a RIM ratio of greater than one. And this is something that we have to explain to our policymakers and customers, because a lot of them still think of these
as being, you know, toys for rich people.

So we have to do a better job and I think the state can help us on that. And then finally, the last slide, you know, kind of a summary. More commercial sector outreach, instead of 75 percent of our load.

Innovations, startups, you know, working, you know, continuing to work with the private sector actors to make sure that we can introduce those innovations into our territory, and then more return on investment of our investments.

And then kind of a bullet list of things that -- additional things. So you know, you saw Bill's graph, which is something that SMUD can do. We are not at the point yet to be able to quantify that, and probably none of the smaller POUs at that point yet, but I think that could be something that we would want to get to in a couple years, as well as the DACs, which are in Burbank, but not as numerous as maybe other territories, as well as addressing medium and heavy duty sectors. Thank you.

MR. CRISOSTOMO: Thanks, Kapil. And for the record, the application that you're referring to is called EV Match, aptly named. Next to John, Jonathan, from NCPA.
MR. CHANGUS: Great. Thank you. And yeah, it's always a pleasure to hear from some of the non-NCPA members so I can learn about Tinder apps for EV charging. It's exciting stuff. Commissioners, thank you for inviting us here and having this conversation.

I very much appreciate both the joint agency approach, having folks from across the board involved. And really appreciate, as well, kind of Staff's prepping for this conversation. It's really more about what can we do together going forward.

And that's a really refreshing response to hear about how we're going to focus first and foremost on collaboration. And it's a continuation of conversations. Commissioner Scott, you were gracious enough to meet with some of the NCPA members, in which we shared much of what we will probably start to continue to include in the IRPs, as far as what other programs we're pursuing.

How are we tackling Transportation Electrification in its very many forms in specific communities? And how are those different or are they the same? We benefit a great deal from some of the forerunners, such as SMUD and Burbank and LADWP and learning from their experiences.
And so as we go forward there's a lot we could talk about on Transportation Electrification, but trying to be responsive to the requests today and the proposals before us. I think there's -- it's kind of a couple of points we want to hit on, and we'll follow up on with -- and written comments, as well.

Just first and foremost, the end goal of market transformation is going to take utility programs and a great deal more. It's going to take your guys' combined efforts. ARB has a variety of programs through ZEV to affect both vehicle and fuel carbon intensity in ways that we can change that.

And much the same as building and appliance standards on energy efficiency are important, so are those ARB programs kind of critical to the market transformation. There are incentive and funding source programs.

You heard from a number of POUs that were able to move forward with charging infrastructure only because of state and/or federal funding to help make those projects happen. And we'd like to, you know, continue to build, right.

We're not starting from scratch. It's not like we're going to start collaborating. We've been
collaborating for a very long time and this is the next iteration of that broader discussion. And so I think it's, you know, very appropriate that as our program starts to mature, in all candor, as we heard, NCPA members are, especially IRP utilities, are bringing up to speed some of their programs.

They have not done quite as much of the research as perhaps SMUD or LADWP some have, and that's a reflection of just kind of the natural EV market that's already occurred. Right now, we're being much more intentional, and that's going to manifest itself going forward.

And so I think there's a recognition that it's appropriate for us to be providing additional information to the state agencies, policymakers, so you're informed as far as what we're doing. Hopefully, not just to make sure, are you doing what you need to kind of to get to 40 percent, but also in a manner of, okay, well, how are we doing at the publicly owned utilities match and align with what's going on at the state level.

What are the other local sources and how do we make sure we're all, you know, oars in the water together? And that's difficult. There's a variety of different programs trying to take different bites
at this apple.

And so it is going to take a great deal of not only agency coordination, but stakeholder coordination, as well. And so our hope is that the IRP is part of a way that we can contribute to that coordination.

I think with the specific system of the data, and we'll get into greater detail in our written comments as far as what's being requested. I think with the high level we recognize the need to provide perhaps information that's not collected today.

There is going to be a degree of ability that differs amongst utilities as far as how granular we can get to. And I think it's really important to be clear as far as there's going to be changes to the IEPR forms, supply and demand, related to Transportation Electrification.

There is proposed changes or additional information in the IRP. There is going to be low carbon fuel standard data that's collected. There's going to be cap and trade allocation data that's collected.

To the extent we're collecting data, let's try and make sure it's as similar and consistent as
it can be. We anticipate EIA at some point, as well, is going to have a form that's collecting this data. And so in the spirit of report streamlining, which the Chairman has heard us speak to a great deal about, it would be really useful to make sure we're not duplicating or creating new efforts solely for IRP.

I get -- the qualitative data I think is really useful. I helped prepare an energy efficiency and a rooftop solar report that we intentionally go well beyond just the quantitative data, because you don't get a feel for a POU community if all you're looking at is a spreadsheet.

You need to hear their voice, and we welcome the opportunity to share that. So I think there's a lot within the Guidelines that jive with what we're trying to do. We just would like to avoid duplication if at all possible.

And you know, Barry touched on a point that I think is, as we all go forward and really important to keep in mind, is that what we're trying to do is EV adoption early on. There's some things with vehicle to grid integration.

There's some more advanced practices and uses of EV charging in the future, but at the --
right out the gate it's, you know, a lot of it's residential charging. What can we do to just get people to make the transition from a gas to an electric vehicle.

And then there's, okay, so how much data can we collect along the way about that. And it's trying to figure out, is EV adoption first and foremost the concern, or is it the data collection effort?

They don't have to be mutually exclusive, but at some point if we get too far down on the granularity and we want everybody to have the same data, it may be something, especially for the smaller utilities where we're spending more time just trying to figure out, can we collect this data, versus, what are the programs and services we really need to be offering.

So we'll get into a bit more detail on the specifics. I'm happy to answer any questions, and again, thanks and we look forward to continuing the conversation.

MR. CRISOSTOMO: Thanks Jonathan, and then to close us out for the POUs, before we get into discussion, Bryan.

MR. COPE: Commissioners, thank you very --

MR. CRISOSTOMO: Your mic isn't --
MR. COPE: Oh, I thought the light was on.

Thank you. Again, Noel, thank you very much.

Commissioners, appreciate the opportunity to be here.

Bryan Cope, Program Manager for Southern California Public Power Authority.

I can make this really short. I could just say, I support everything these guys said, because everything Nancy said and the rest of the panelists I fully support and endorse. But I would like to expand on a couple things in response to things that -- one thing that Commissioner Peterman said at the very beginning, that Jonathan alluded to, was collaboration.

And I think that's really important because if we don't work together we're not going to get to a common goal, and I think we have a common goal. I think all the utilities in the room agree and understand the importance of Transportation Electrification, and we support that fully.

I have the pleasure of helping all of my members, or all of SCPPA members develop programs, including Transportation Electrification Programs, and L.A. and Burbank are just a couple examples. All of our members are developing programs to different degrees and levels.
Unfortunately, not all the utilities have the proper metering infrastructure to develop time and use rates. And a lot of people will say, yeah, we need time and use rates and that'll solve a lot of the problems.

There's a cost to that and people don't really recognize that all the time, that if you want to go to time use rates, it's going to require an additional cost. So there are some considerations that need to be made in that regard.

Also regarding Noel's request to make sure that the Guidelines include a suggestion that utilities should be leveraging additional funding, and I want to make sure that you recognize SCPPA was one of the early implementers of a CEC grant.

We installed 16 chargers in southern California along the corridors, 90 C fast chargers and seven level twos. And we were very successful and I thought that partnership was an ideal opportunity for us to collaborate, and I think it's a good example of how we can work together.

Other than that, you know, I think what's really important is the members all have different needs. Kapil's going to be focusing on workplace charging. A lot of our other utilities have 50
percent or more residential customers.

So they're going to be focusing on developing residential charging to get a lot of the charging at night for the grid value. So you know, it's -- I think a couple of different people have said it. Not one size fits all.

So each of the different utilities are going to require different programs to meet of the communities that they serve. So Dave and Tom were talking about, I'm going to kind of -- I don't have the numbers like Kapil did in the Guidelines, but I'm going to jump around a little bit here.

The market is changing very fast and we need to recognize that. No, that's okay. Thanks. And you know, part of that is you got to be recognized by the Commission Staff going forward. Particularly in this first round of the IRP development for many of the utilities is that a lot of the data that's being asked for, you know, it's on point.

The things that -- the data that you're suggesting be included, it's accurate and correct, but it's not available for everybody. And you need to recognize, to Jonathan's point, I think the IRP submittals this year could be more qualitative than quantitative, and you're going to see increasing
amounts of quantitative data be made available in the coming years, months, but it's maybe not right there. It's not there right now and I just hope that we can work together to expand on that data availability going forward, rather than get all upset if we don't give it to you right now, because it's hard to give you what we don't have. That's just a thought in that regard.

Barry made a good point at the beginning about, this is customer driven, and I think what's really important for the Commission to remember is it needs to be simple for the customer to increase adoption. And I think working together we can get there.

The last suggestion that Noel had -- I think Noel's slides closed out on, what can the Energy Commission do to help us help you, and I've got three or four ideas, if you don't mind. First would be it's been clearly supported by the panelists all through the day is that incentives are needed, both for infrastructure development and cars.

The Energy Commission and the State of California I believe have a direct impact on the ability to install infrastructure for utilities and in the private sector, and also for people to be
incited to by -- purchase electric vehicles. So
that's an important strategy going forward.

The other point is, the state has access to
EV data from the DMV that isn't necessarily available
to the utilities, and we would encourage the
Commission to work with the state to, as Kapil
suggested, periodic EV data updates and potential
forecasts to extrapolate out the existing data to see
where we're going, because a lot of the utilities
don't have the band width or the capacity to develop
their own internal forecast.

So if they've got something to start with
that's a very helpful opportunity. And another
related working with California Department, would be
I would encourage the Energy Commission to continue
to work with the PUC and CARB to develop estimations
for GHG so that everyone's working with the same data
points, rather than guessing at it, what your own
utilities' greenhouse gas impacts could be.

And lastly, I'm going to go back to the --
another point that I've made in energy efficiency
related issues, is that if the Energy Commission and
the state really wants to endorse electrification of
the transportation sector, I really would believe
that the state could take a stronger role in
education and outreach for people in the state. It worked for the drought. The state came on board and said, hey, you guys need to save a lot of water because we're in a bad drought situation. If you really want to reduce greenhouse gases through electrification, same kind of public outreach and advertising program could be an effective way to get that message out and would help support all the utilities' efforts.

And lastly, I just want to make sure that we aren't reliant solely on utility programs to reach the electrification goals. I think one of Noel's points was that the utilities are critical, and I don't disagree with that.

But at the same time, we also need to be reliant on the private sector to get utilities, the private sector and the government working together and collaborating to a common end goal. And with that I can close out the POU statements. Thank you.

MR. CRISOSTOMO: Thank you, everyone. Any initial, quick responses before we get into the discussion for 15 minutes?

COMMISSIONER SCOTT: Well, no. I'd like for us to jump into the discussion, but I do appreciate the thought and care that you have put into the
comments that you brought for us here today, and I really look forward to seeing the additional comments in writing. I don't know if Commissioner Peterman's got some questions.

COMMISSIONER PETERMAN: I have a few questions, and perhaps I will just say what they are, and if they can be answered as a part of the dialogue that you're planning to have, that would be great. Thank you very much for the presentations. It was very informative for me to understand what's happening with the POUs and how y'all are thinking.

One just gets to the last set of comments around data collection or the availability of data, and that's something that we're looking at, as well. And I'd appreciate if you could identify for me what are some of the data points that you think won't be available immediately for the first IRP that you were mentioning. So that's one.

Two, and then kind of related to that, is there anything that can be done to support -- further support data collection. You mentioned incentives for vehicles, but are there incentives for any type of data collection development system, software, et cetera. So that's one.

The second is, I'm very interested in
understanding what you see as the ideal end state for POU engagement with Transportation Electrification. It was mentioned that not all POUs have invested in meters to do time of use pricing.

Is that expected to happen or are you envisioning a world where we will always have a set of POUs that don't have time of use capable meters? Are you envisioning an end state where we eventually will have vehicle grid integration and bidirectional power flow between the vehicles and the grid, because that's the end state we're envisioning for the IOUs.

And so it's helpful for me to understand if it's a matter of timing, or if it's really just a different vision of what the utility role will be. And then my third question gets to IOU and POU coordination.

You talked about a customer centric approach which I fully agree with. And so you have your customer who on a very exciting day may travel through Burbank and LAWP and Edison territory in a short period of time.

And so I'm really interested -- and again, it gets to that in-state question about, what will be similar, what will be different about a driver's experience through those utility service territories.
So most immediately, if you can speak to what type of coordination you're already doing with the investor-owned utilities on Transportation Electrification, or where you see yourselves coordinating over the next couple years.

MR. COPE: All right. Thank you. The very first point I can speak to directly. In 2012 we, SCPPA, sponsored a request for proposals in association with Edison International. That was initiated from Ron Nichols, who at the time was general manager of LADWP.

And we at that time, we decided we needed to work collaboratively to understand the opportunities in the electric vehicle market in southern California. So we commissioned a study that was actually performed by a consulting firm we acquired through an IRP.

And it was very successful, which led to the Electric Vehicle Working Group, which I chair for SCPPA and is participated by all of our members. So we a long time ago recognized, Commissioner, the importance of working with the investor-owned utilities.

Their rate structures are different than ours and their business models are different, but
they have the same intent and the same end goal. The end state there I don't think is too drastically different from them and from us.

I think the speed at which we get to that end state is probably a little bit different, and I think that speed is going to vary between utilities. I think L.A. and SMUD are at this point, and there are others along an exponential growth curve to catch up to that, but I think they'll all get there eventually.

I don't think that it's unreasonable to think that even the smallest POUs eventually will probably need to have time and use rates, but it's a cost issue of how soon can you afford that. And so I think that summarizes that end state question that you were getting at.

I think ultimately California utilities in general will all probably end up somewhere very similar.

COMMISSIONER PETERMAN: [Is the Southern California electrification work group still] going?

MR. COPE: It is. We meet monthly. We have a regularly scheduled meeting every month, and we meet on an ad hoc basis, as we need, for special presentations, so.
MR. CRISOSTOMO: So it looks like we have 12 minutes. And thank you, Commissioners, for your questions so that I can manage our time to chunk out the questions that we have around forming better, more effective IRPs.

I want to draw a connection to what our previous panel on DC fast charging were talking about in terms of taking care of customers. That's clearly a connection in terms of improved service and meeting them where they are, providing them what they need.

One of the interesting things around data gathering in terms of the connectors that we've deployed or the kilowatt hours from the charting station standpoint to the vehicle standpoint to the meter standpoint is understanding the load shape.

That's probably one of the most basic things that some utilities might have, if they have EMI or separate meters, or not. And so I guess I'd like to hear a variety of perspectives on how we can work with either the charging provides or the OEMs or with the AMI systems or other approaches to gather that really kind of basic unit of information.

MR. CHANGUS: Happy to kick that off.

Jonathan Changus, with NCPA. I think also to just kick -- with regard to the smart meters and when
they're coming, I don't see it being an interminable future where it doesn't make sense.

It's a customer information system, a meter down to management system, an AMI rollout, which for small, midsize utilities, is a lot to undertake all at one time. And so for the purposes of IRP those utilities are in -- are on track. There's a plan.

And so I don't think it's going to -- now, Biggs and Gridley on the other hand, it's a different track for the IRP utilities. I think that that will be available here and in coming years. What will not be available is meter-specific.

You know, with public charging there is potentially for separate metering, but for residential charging for the purposes of low carbon fuel standard, there's an estimation methodology that's used currently.

And so if we're trying to get more granular than that, there's just -- it's not there yet. So those are the types of things that we won't be able to get meter level. Can we provide an estimation similar to what we did for low carbon fuel standard? Absolutely.

So that's where the consistency and understanding the different granularity. To working
collaboratively with some of the other folks as far as about the sharing of data, you know, that's potentially a more complicated question, depending on, you know, how open data it is.

And maybe I'll let some others that have had direct experience with different third party charger share. I don't know if I'm answering the question directly. Maybe you could reframe it again. What exactly in the IRP you'd like to see from us?

MR. CRISOSTOMO: I know through some of our investments in the RFETP there are data collection opportunities that are going to be set up with different EVSPs where they might be reporting some usage information that could be helpful for load shaping.

I know Kapil is looking for an opportunity to create a commercial load shape. Did I understand that right?

MR. BOYCE: Let me jump in here. In nuts and bolts, one of the real issues is there's a lot of variability across all the different charging. For instance, I think pretty much like what Tom Ashley was showing earlier was free charging, DC fast charging in Los Angeles. All that was free.

So people are charging before work and after
work. Things like SMUD with our DC fast charging
where we do have a fee, we tend to see a lot of
charging right at noon. People come in, charge
around on their lunch hour.

We actually get about eight or nine charges
a day. There's other things I see downtown where
level one charging's free. Level two has got a fee
and nobody charges level two. It's all -- so there's
still a lot of those types of market effects that
make it really hard to categorize load shapes in kind
of a macro sense.

And I think, you know, one of the things you
want to think about as a Commission are those
different types of things. How much free charging's
going on at workplace, you know, that type of stuff.
Also, if you think about it, free workplace charging
really helps fill the belly of the duck curve.

You don't have to do anything more than just
put it out there and you start filling the belly of
the duck, with or without pricing signals. The other
one is, at SMUD we have a flat employee fee. They
pay $10 a month, essentially. It's $5 a pay period,
but it fills up that belly of the duck just because
it's there.

But anyhow, I would suggest you really need
to try to characterize some of those big things, like free versus nonfree, estimations, all that have a huge impact on the overall load. When I think about things like an IRP, how are you going to match this up, you know. Do you need fancy control systems or do you just set really different rates that motivate people financially.

People are pretty motivated financially in this electricity than I see in any other type of use; really interesting.

MR. CRISOSTOMO: I guess to keep the ball rolling I want to kind of pose that question back to the other panelists. Do we need really highly granular, extremely characterized, segmented information? Or how would you approach that?

MS. SUTLEY: At least I think the way that we approached it our IRP, it's a planning document and that's a lot for us focused on strategies or on where we going to be in 20 years. And I think one of the primary drivers for LADWP is greenhouse gas emission reductions.

And so trying to insure that we're, you know, meeting our customers' needs going out 20 years and also able to sort of optimize, I guess, for lack of a better word, our greenhouse gas emission
reductions goals, that's -- I think we're -- as we looked at different scenarios in different cases in our IRP, that's really the difference, is what's the best way to achieve our greenhouse gas emission reduction goals, because we're going to serve our customers' load, and no matter what.

One other thing I just wanted to add on the previous question is we -- you know -- we were the cosponsor of a large smart grid demonstration project with the Department of Energy, which concluded last year. It was Recovery Act money.

We put in half. DOE put in half, and a big chunk of that was around a lot of research at universities, USC and UCLA, around integration of EVs and a whole set of research projects around sort of pricing structure and incentives, rate incentives and things like that.

So there's a lot of information around the results of that project that might be interesting.

MR. KULKARNI: Yeah. For us, when you talk about the load shapes, I've had to -- you know -- in some of the discussions I've had with our internal IRP team, I've had to tell them what the load shapes are just because it's so minimal that they have -- they don't see the impact of it.
And I think that that'll probably change over time, but you know, especially as we add more in place charging, but their main concern is balancing non-solar and solar resources, and managing load. So and also, we have basically three data collection systems for our EV chargers, one with ChargePoint, one with Greenlots for the public chargers -- or each of them with public chargers, and then our meter data management system for I guess meter data.

And for residential we see that the time of use rate really does have an impact. People start charging at 11:00 and when it's eight cents per kilowatt hour and they don't typically charge during the day.

But for commercial and workplace they may not be charging that much until we institute something like super off peak to where it comes out to say five bucks a month or very minimal costs. So I think that'll be one of the steps that we try and gather more data on.

MR. CRISOSTOMO: Bryan, did you want to get in and say something?

MR. COPE: I think Kapil's point is that -- is spot on. The data points aren't big enough to really be too big of an impact right now. But like I
said earlier, in the coming years it will continue to grow, but I don't think that you do need a granular breakdown of what the load shape is, per se, right now.

MR. CRISOSTOMO: So that kind of leads into maybe a final question with another go round, to Bill's point about the potential for intelligent smart charging to reduce cost. One of the specific additions to the IRP Guidance was the inclusion of cost data.

And to work the theme of the diversity of the POUs it's going to be difficult to compare a transformer upgrade or a substation upgrade associated with the EVs across all -- more than a dozen of the reporting POUs.

Are there ideas of how we could best quantify those infrastructure costs consistently? Or how do you collect costs right now? Maybe you can simplify it.

MR. COPE: While Bill's thinking about it, this is Bryan Cope from SCPPA, I really haven't heard too many examples, Noel, of any of our members experiencing significant capital outlays for infrastructure improvements to serve EV load.

Yeah, I just -- it's just not coming to me.
I don't -- I can't think of too many examples, if any.

COMMISSIONER SCOTT: Yeah. But I think at least for us it hasn't really come up with respect to residential or workplace charging. I think where it's going to come up is in the medium and heavy duty, both because the chargers are very specialized and they're very expensive, and then the infrastructure to bring that.

So as we look at, as we're working with the Port of Los Angeles, for example, or L.A. World Airports, LAX, those issues I think we're going to have to address. And we are looking at different ways to do it, both in terms of this -- how we provide additional service to our large commercial customers, and potential using LCFS money and others to -- other -- to try to fill in some of those gaps.

MR. COPE: But just real quick to support Nancy's position, I think she's absolutely right. Medium and heavy duty vehicles and ports and airports, that's where the larger load impact is going to hit.

But at the same time, I don't think utilities are going to undertake those kind of infrastructure improvements unless they can cost
justify them. You know, if it's going to cost $1 million to upgrade for -- to build a new substation for, you know, transit buses so they can all charge on the same spot, there's going to have to be a $1 million in value before the utility.

You know, be it a societal benefit test or true just pure economics, the value has to be there. Otherwise, it can't be justified by the communities that the utilities are supporting.

MR. BOYCE: Yeah. I was going to reiterate, you know, all of the ones where you've got more of a commercial application where there's a service upgrade being made as part of a normal application to support electrification.

You'd have the ability to get that data. Residential data, all those grid impacts that I showed you are all modeled, and that type of data is very difficult to see how it plays out in the field. You know, if you want to know how we did all that, it's probably a special, one-on-one presentation that we can do offline.

MR. COPE: Cancel that.

MR. BOYCE: Yeah.

MR. COPE: And I think the final response here is, to borrow from distribution resource
planning world and some of the more than smart effort
about crawl, walk, run, I think some of the questions
being posed about data that we'll want to collect and
consider, because there will be impacts, are things
to consider in the future.

I think right now we just need to get some
base level market adoption up. We need to see more
EVs charging at home and then move out to the
workplace and move to the public. We're at very low
penetrations right now, such that it doesn't make
sense to do a whole bunch of load forecasting for a
lot of at least NCPA members.

But that's going to change, especially as we
see the batteries getting larger, the expectations on
charge rates dropping, you know, where the market's
headed, those are the questions we're going to want
to consider.

But today, what are EV plans and programs
today, it's about getting people into the seats of
EVs and how, as we, as utilities, can help facilitate
that. And then in the future we hope to be able to
have to answer those questions because there's such
an EV load and there's so many vehicles out there,
but that's not the case today.

MR. CRISOSTOMO: Well, I'll close with just
a promise to continue working with Staff at the other agencies to insure that our efforts collecting information across PUC -- or CEC, PUC and ARB and the others are helpful, and really want to thank y'all for your times and thoughts today.

MS. RAIGHT: Thanks. I'd like to invite our last panel up to the tables, please. Thank you.

(Pause)

MR. CRISOSTOMO: To Commissioner Scott. Okay. Everyone wants to take a in-place, don't leave the room like five-second standing break, just to -- because I benefit from that. I know it's late in the day and this is the final panel, and thank you for everyone's attention.

So I'd like to provide the context for this last stakeholder response panel. I'll introduce our panelists. Unfortunately, the first one who's listed caught a cold and was unable to attend, Geof Syphers, from Sonoma Clean Power.

Sonoma has been doing some very interesting work that is crossing transportation and utility planning with climate action, air quality improvement, regional transportation planning and it's general public policy as a county.

So we were hoping to have him present on
that perspective, but unfortunately, he isn't able to attend. But we do have diversity of stakeholders from the environmental, automotive, environmental justice and consumer perspective.

Unfortunately, I don't see Katherine Stainken, from Plug-In America, but we do have Laura Wisland, from the Union of Concerned Scientists, who works on Integrated Resource Plan for UCS. Steven Douglas, from the Alliance of Automobile Manufacturers, Beau Whiteman, from Tesla, and Shrayas Jatkar, from Coalition for Clean Air.

So each of them will have just a few minutes to provide some broad perspectives on what they have heard today and what they've learned from the technical panels, and to provide a reaction on what the utilities are proposing in their preparations for electrification.

So in your responses to the following question please explain what your reactions are to the POUs, IRP and TE policies, and what data are you collecting to continuously improve your efforts to promote electrification. So we can start with Laura.

MS. WISLAND: Okay. Thanks, Noel, for the opportunity to speak. For those of you who don't work with me, my name is Laura Wisland. I'm an
energy analysis with the Union of Concerned Scientists out of the Oakland Office.

I work on clean energy policy, development and implementation, and for the past three or four years we've been doing a lot of in-house work and research on implications of high levels of renewables on the grid in California and how to mitigate some of the challenges we're seeing, a la the duck curve.

So I think a lot of the things that I wanted to say have already been said in terms of the broad level potential benefits that electric vehicles and flexible load can bring to the grid and how we're going to manage the grid in the future.

But maybe I should just back up and explain why I think Noel wanted me to come here today, was some of the research that we've been doing. And that's basically taking a look at the duck curve, the two main categories of challenges we see on the grid with high levels of renewables.

The first one, of course, is the belly of the duck, so we're going to be in the fortunate position of having too much clean energy on the system during times like this, actually, the middle of the day in the spring when loads are low.

And so we do think that electric vehicles
could play a very important role in taking advantage of some of that low-cost electricity. And so I think the IRP is a really good place for the Energy Commission to be encouraging the POUs to be thinking about all the different ways to take best advantage of that solar electricity and minimize the need to curtailment while balancing costs, of course.

And putting policies in place to encourage time of use rates and workplace charging may be one of the most cost-effective ways to optimize for carbon and costs and grid reliability all at the same time.

One of the things that I'm hearing and I'd like to actually follow up with some of the POUs after this is that TOU rates aren't -- it doesn't seem like so far they're showing up to be a silver bullet in all cases.

And so it could be that we need to think -- we need to not just assume that if we put different rates in place that everybody's going to switch to that. There needs to be really good outreach that's being done by both the car makers as well as the utilities, so that people have a really clear understanding of what's going to happen to their electricity bill when they purchase an electric
vehicle.

And there also obviously needs to be adequate available workplace charging. So I was hearing some of the POUs saying, a lot of our load is residential. So we don't have as big of a role to play in promoting workplace charging.

And clearly, we all know that encouraging charging in the middle of the night is better than encouraging charging during the morning peak or the evening peak. But asking the question even if you primarily dealing with residential load, are there other ways that these POUs can help encourage daytime charging for their customers, as well.

The other thing that we've been looking at in our analysis of grid impacts of high levels of renewables is how to meet that evening ramp. And I think one of the things at a high level we're most concerned about is that unless we figure out how to lower the neck of the duck, we're going to be running gas plants in the middle of the day so that they're up and ready to go, and meet that evening ramp, which is going to make the solar curtailment situation even worse, because the gas is going to be online in the middle of the day and be crowding out the solar.

And so obviously -- and so part of our
research has been asking the question, how can we
insure that the gas is not online in the middle of
the day. And obviously, helping make sure that EVs
aren't charging during those peak hours helps to
lower the neck of the duck.

But there's also been some discussion about
whether there are opportunities to allow the electric
vehicles to provide certain other grid reliability
services that would reduce the need to rely on gas
plants to provide those services.

It may -- and another thing that the
gentleman from SMUD I think implied is that that may
be cost-effective in situations with very high levels
of renewables, but transaction costs may be so high
that figuring out how to use other types of zero
carbon technologies to provide those grid services,
like frequency response, it may be more cost
effective to look at other solutions, rather than try
to aggregate a lot of EV services.

I don't think we know the answer to that
yet, and I think that the IRP and the scenarios that
are run in the IRP could be a really good place to
trade off some of the costs and benefits to thinking
about using EVs to provide services like that, as
opposed to thinking about other types of carbon free
technologies to provide those services. So I think I'm going to stop there.

MR. CRISOSTOMO: Let's just go around the table. So Shrayas, or Shrayas. I apologize.

MR. JATKAR: Good afternoon. Shrayas Jatkar, with Coalition for Clean Air. We are one of the five groups that serves on the Steering Committee of the California Charge Ahead Campaign, and that campaign is focused on implementation of Senate Bill 1275 from a few years ago that not only sets a target and statute for the number of EVs on the road, one million by 2023.

It also requires that incentive programs and particularly those at the Air Resources Board funded with cap and trade revenue, are directed and increase access to electric vehicles for residents of disadvantaged communities, as well as low-income households in the state.

And so I'll try to focus my comments really on that target population of low-income Californians, including those that live in disadvantaged communities, according to Cal Enviro Screen. So to answer the question about sort of a reaction or response to what I've heard from the publicly-owned utilities, I think two things.
One is we would certainly agree with the focus on getting more vehicles on the road, that that's still -- I think there's still a great need, in particularly, getting more cars on the roads in terms of within disadvantaged community census tracts.

We've been mostly following the incentive programs, as I mentioned, at the Air Resources Board. There are two in particular that provide rebates to consumers, the Clean Vehicle Rebate Project and one that is very targeted towards disadvantaged communities and low-income Californians, and that's the -- pardon the long name -- but Enhanced Fleet Modernization Program Plus Up, or EFMP Plus Up, which is more of a scrap and replace model.

And what we found is the program, you know, it's sort of perhaps obviously, that the program that is very much directed and targeting disadvantaged community residents has a high uptake in those particular census tracts.

Whereas, the first come, first serve model of the Clean Vehicle Rebate Project, or CVRP, the number of those rebates that are actually going to residents of disadvantages communities is less than 10 percent.
And that's even after the last few months or almost a year, actually, where we've seen more income-based criteria that sort of shapes the rebates that go out from CVRP. There's an income cap in place. There's increased incentive for low-income Californians, and still, we see just about seven percent uptake of CVRP rebates within disadvantaged community census tracts.

So it's not only that some programs are designed to reach certain populations. I think one of the reasons that the Plus Up Program has been so successful is that it's -- there's considerable effort to actually meet and talk to those residents that live in disadvantaged communities.

And so the amount of resources that are required is pretty significant. So I think when it comes to the publicly owned utilities, you know, I didn't hear, except for maybe SMUD, a real focus on disadvantaged communities, and you know, there's a lot more detail we can get into of what that looks like in terms of the level of effort needed to really serve disadvantaged community residents.

And the last question I'll just touch on quickly about data that we're looking at, it's not so much data that was referred to earlier, but I wanted
to just point out that, you know, we're also thinking about car-sharing and sort of alternatives to vehicle ownership.

There are some pilot projects that the Air Resources Board is funding, but those projects have not really gotten off the ground yet. As we probably all know, bureaucracy is still an issue and moves some of these dollars very, very slowly.

So even dollars that were appropriated years ago have not actually reached the end-users. The pilot projects in Sacramento and LA for EV car-sharing haven't really gotten off the ground, and neither has the Ag Worker Van Pool in the San Joaquin Valley.

So we're very interested in seeing those programs get going and learning from those programs, because as much as we want to see cleaner vehicles on the road, you know, vehicle ownership isn't the only model to get there.

MR. CRISOSTOMO: I know you have a presentation, so I can --

MR. DOUGLAS: Thank you very much. I'm Steve Douglas, with the Alliance of Automobile Manufacturers, and just a little background. We represent, the Alliance represents 12 car and light
truck manufacturers, or about 70 percent of the new vehicle market in California.

So I thought what I'd do is tell you a little bit about what the automakers are doing so you know where we are on that, and then focus in on what the utilities, both POUs and IOUs, can do and the things that are kind of focused for us to make this ZEV market.

So if you'll go onto the -- a couple slide. I think everyone's aware of what the zero emission vehicles are, plug-in hybrids, battery electrics and then fuel cells. And the next slide. And you know, we do have a mandate. We have to bring so many electric vehicle or so many electric vehicle credits.

So what manufacturers are doing are more models, more variety, longer range, better performance, more options, and then aggressive vehicle incentives, and I'll touch on each one of these are we go along.

If you go to the next slide, please. So these are all of the ZEVs just from the Alliance members. These are cars that are available today. They are high qualify, reliable, safe, fun to drive cars. They're at the dealerships. They're on the roads today. And this is just from the Alliance
members.

There's I think seven or eight others from non-Alliance members. So there's over 30 zero emission vehicles on the market. And I just point out, these are not just all small cars. They're SUVs. I think there are five SUVs.

There are six different all-wheel drive vehicles. There's small cars, large cars, station wagons. I didn't even know we made station wagons anymore, and yet we have one that's a ZEV. So and then if you'll go onto the next slide.

And I wanted to address a couple of myths, I think. And the first, and you see this in survey after survey when we do polling, is people say, well, why don't you want a ZEV and they say, well, they're too expensive.

Well, that's not the case. So what I did back in February is I just went to Google and I said, Volkswagen E Golf, lease deals, California. So and I found the low cost lease deal, and I did that for each one of these vehicles.

And if you see on the far left there the E Golf, the Focus, the 500-E, the Nissan Leaf, these are great cars. And so I found the total cost for CVRP eligible people. So 36 months times the monthly
payment, plus the down payment, and then I subtracted off the CVRP, and there they are.

And those bottom four, they're like -- that's like two grand over the course of a three-year lease. That's 60 to $70 a month. Sixty or $70 per month. That's less than the price of the data plan for this phone. Doesn't even include the phone.

So if you go to the next slide, and as you'd mentioned, for low-income Californians they get an additional $2,000 through the CVRP Program. So it's not really higher math at a $2,000 total lease cost if you give a $2,000 check, the total cost is zero.

You need to go to the next one. If you live in the San Joaquin Valley, the San Joaquin Valley has a Drive Clean Campaign, where they give $3,000 for battery electric and fuel cells and 2,000 for plug-in hybrids. So here, you actually make money leasing these cars.

So you know, two to 3,000, you can buy a bunch of phones with that, with the money you're making from these. So that's the first one. So they are available. There's a lot of them available and there's aggressive pricing.

Obviously, this includes the federal rebate and also includes the CVRP, but the manufacturers are
also incentivizing these to a very high degree. So if you can go to the next slide. So that's what we have now.

And let's talk a little bit about where we're going in the next few years, and this is by 2021. These are 37 battery electric vehicle models, and I draw your attention to the right three bars. So there's 24 different models that have over a 200-mile range.

And that includes four standard SUVs, over nine small SUVs, large cars, mid-size cars. I mean, there's just a lot of vehicles coming. So that's on the battery electric side. If you go to the next slide, and the same thing on the plug-in hybrids, over 36, and just, you know, large numbers of SUVs, large cars, mid-size cars, small cars.

And all of these number -- all of this data I got from ARB, their mid-term review that they issued at the beginning of this year. So I think that's kind of the manufacturer's role. We make cars and the manufacturers, the automakers have invested tens of billions of dollars to develop these vehicles, bring them to market, and more are coming.

So we'll have twice the number of models in the next five years. If you go to the next one. So
okay. So what about the state and the -- I mean, the
POU and the IOUs, as well, and then state in general,
and the next slide.

I think everyone knows California's the top
seller of ZEVs. In fact, they sold more than twice
as many as all of the other states combined. So the
next one. But we're not stopped. We can't just stop
there. So everybody has a target. These are all
targets.

They're not regulations or requirements, but
you know, SB 1275 has a million vehicles by the end
of 2022. So that's actually January 1st of 2023. So
that's three times as many vehicles over the next six
years as over the past six years.

And then the Governor's Executive Order, the
ZEV Action Plan, that's five times as many by 2025.
And then ARB, not to be outdone, they came out with
their own target. And again, this is a Draft Scoping
Plan with 4.2 million. You've heard that.

So there's kind of no stopping. We have to
keep going. We have to keep making progress. If
you'd go to the next one. So what are the priorities
for growing the ZEV market, and these are not in
order of priority for us, but just kind of focusing.

The first is simple, low-cost electric
charging at home, and also, retail electric charging, as well, but I don't even go into that because at least from the IOU level and possibly -- I'm a SMUD customer, so my rates are pretty low.

But if you go to the next chart, this is the kind of complication, and you can't hope to try to explain this to a dealer salesman or a dealer, to try to figure out how much it's going to cost to fuel an electric vehicle.

So there's five different, PG&E time of use rates. So Cal Edison has four and then there's flat rate, and most people are flat rate. And if you go to the next one. So it's complicated. It's complicated and it matters.

You know, it's not like it doesn't matter. These are the -- so the question is, does it cost more to drive electric than it costs to drive gasoline, because that's the second myth, is that -- I see it all the time. It's like, driving an electric vehicle is like paying a dollar for a gallon of gas.

Well, no, it's not. Most people are flat rate and these are the gallon per gas equivalent costs for that. So that's important. So the next slide. So the low-cost fueling for electric
vehicles. And the second thing is, the rates are really complicated.

This is So Cal Edison's rates. So you have four different plans. You have four different sets of targeted use. You have peak periods, super off peak periods, peak rates, off peak rates, super off peak rates.

Monthly, some have monthly fees. Some don't. Some are tiered. Some aren't. You can't expect customers or salesmen to figure this out and try to explain it when you're comparing it to a gasoline car that you say, 40 miles per gallon and everybody knows it's 2.50 a gallon of gasoline.

So next slide. And this one person did this. This is how they figured out what's the cheapest time of use rate. They went hour by hour for a week in the summer, and this is the So Cal Edison, and then they had to compare how much electricity they used hour by hour for a week in the summer.

They did the same thing in the winter. That's simply too complicated, and what we need is something that a dealer or salesman could explain in one sentence, not a, when do you wash your clothes. Can you do your laundry at night.
So the next slide. The next thing is fueling infrastructure and that's something that many people brought up today. It's critically important. Then if you go to the next slide. I mean, we're behind today.

So NREL did a study, and I think everybody in this room's probably familiar with, but it said you need about 100 to 200,000 charge points at workplace and in the public and workplace chargers, and these are all level two.

Today, we're at about 13,000. So about 13 percent of the minimum. So 100,000 was if most people charge at home. 200,000 was if most people charge away from home. So we're at 13 percent. I think with the PUC's activities it'll bring it up to about 20, 25 percent, but that's is, and this is for a million vehicles.

So and this is not some theoretical thing. I drive a battery electric vehicle, and you know, four years ago when I first got one I could be pretty certain that I would get a charging space when I went to work.

I am equally certain today that there will be no charging place when I get to work. I mean, that's a fact. We're falling behind. And so and
this is just for a million, and that's not the end

game.

You know, we're talking about, you know, a
million and a half, 3 million, 4.2 million. So I
mean, we're falling behind and infrastructure is
critically important to give the customers the
confidence they need to buy these vehicles. Not to
mention that the infrastructure when it's public also
kind of spreads awareness.

So next slide. And so these are our
priorities kind of in order priority, incentives,
incentives, fuel cost. It needs to be simple, low.
The infrastructure, it's needed, and then consumer
education and awareness.

So those last three are kind of utility-
centric, the fuel cost, the infrastructure and
consumer awareness and education. Thank you.

MR. CRISOSTOMO: And then Beau.

MR. WHITEMAN: Sure. It's mine. Okay. I'm
on. I don't have a presentation. It was just going
to be a picture of a bunch of Tesla cars. But my
name's Bill Whiteman. I'm a member of Tesla's
Government Affairs Team, taking the lead on all
things EV infrastructure.

So of late it has been a lot of engagement
with utilities and working with their regulators to help support these types of investment programs. Briefly, I'll give you a quick outline of kind of where we've come from, where we're going and why we're so excited that utilities are interested in getting into this space and the value that that brings, not only to us, but to all automakers and EV drivers.

So we're currently selling two products, our Model S and Model X, both in the premium segment. I think as of this week Model S is our cheapest car and it's like 76,000-ish. We've discontinued the lowest end model in preparation for Model 3 launch later this year.

And as we move from the premium segment into more of the mass market with our upcoming Model 3 this summer, which will start at about $35,000 and be produced down in Fremont to the tune of half a million units a year by next year.

Oh, for those of you on the Webinar, my fingers are cross when I said that. So we're all very optimistic. And as we make this shift we're going from a segment of buyers who generally own their own home, they have a driveway or a garage.

Or if they live in a multi-unit dwelling,
they're doing okay and they really don't care if it costs them a little bit extra money to install a home-charging solution. But by and large our customers complete the majority of their charging either at home, or also, when you're in this segment, a lot of them are self-employed and put in a charging station at their office and then some for their other employees, which is great.

But by and large, they're charging on level two systems. We've been heavily investing in the super charger network over the last five years to support long-distance travel, and that does supplement a small percentage of total fleet fuel.

But by and large, people are charging their cars when they're parked. And this, and level two charging offers the most benefits to utilities, to environmental causes, because we can take, especially in California, that energy during the middle of the day that's being under-utilized and put it into storage vessels somewhere.

The challenge that we have is the up-front investment of a charging solution at a workplace or a multi-unit dwelling, or well, let's bring in disadvantaged communities, too, because I think it falls right in the same vein.
If you're a renter you're not likely to want to invest 1,000 or more dollars in your own property for a home-charging solution, and a lot of the utility proposals and programs that have now been approved are seeking to fill this gap, which is fantastic.

There's always going to be a need for DC fast charging. We believe, however, that it's always going to be a small percentage of fleet fuel. We're not going to have a world where people are driving their EVs just like they're driving their gas-powered cars, especially in cold climates.

If cars are sitting out overnight and not plugged in they're going to lose battery charge and performance capability due to being left out in the cold. So in terms of kind of how we get this all out in front of customers, we very famously don't franchise and have -- I just counted on our app -- we have 29 stores in the State of California, most of them in high footfall, retail centers.

If you go down to San Jose we're at Santana Row. If you go down to Oakland, we're in Walnut Creek, places where tens of thousands of people walk through every month and come by and see us. And even if they don't buy a Tesla, that's okay. We're happy
that they come in and talk to us and learn about the
benefits of going electric.

Part of our efforts in recent history is
getting a handle on all of the utility investment
programs that are available and making sure that our
customers and charging partners are aware of them and
that we're helping maximize their impact and getting
them into the communities where cars are.

I guess with that I'll yield my time, and if
there's questions, I'm happy to answer them. Thank
you. Oh. Oh. Sorry. One more thing. I'll
mention, we -- our CEO tweeted about another pending
product, our heavy-duty semi-truck that we'll be
unveiling later this year.

So we'll be -- we've already intervened in
the tree ongoing proceedings, well, that have now
been consolidated with the CPUC to which are
proposing have big investments in the heavy duty
side, which is going to be a very exciting and
challenging arena, but also going to be super, super
cool.

MR. CRISOSTOMO: We'll include the tweet in
our record.

MR. WHITEMAN: Yes, perfect.

MR. CRISOSTOMO: So let's start with the
automakers. Yes. Given the advanced technology that you're developing and are being complemented by the private industry efforts that we heard about today, how does that -- and as also the modifications to the mobility business model, like how does that affect expectations for deployments and the utility response to that potential disruption or takeoff in the market?

MR. WHITEMAN: Wow. Sure. I'll dive into that. So we -- I can't remember which one of the folks in the POUs mentioned this, but there is an awfully large pot here, so to speak, when it comes to the amount of infrastructure that's needed to support electric vehicles.

As we, you know, we have our own production goals and the state has its adoption goals, and in order for both of those to get together there's a whole lot of infrastructure that's going to be needed, and we have, you know, made a name for ourselves as we've gone it alone on building out a network to support our drivers.

But at the same time we are so excited and welcoming of everyone else who wants to come and joint this massive arena where there's need. As to your other part of the question in terms of different
business models for vehicle ownership, was that where you're going, too?

It's going to be an interesting future. Obviously, with the more automated features becoming available on vehicles and the ability for some day self-driving cars, you know, the ability to reduce your individual need for vehicle ownership increases.

And for us at least that hasn't changed anything yet. It's an exciting future. In the announcement of Model 3 we included the possibility -- well, not -- it's more than a possibility.

It's going to be a thing some day when the cars can drive themselves. It can drop you off at work and go and chauffeur people around all day for you and make you money on the side. We're a little ways off, but it's coming.

MR. DOUGLAS: Yeah. And I think I'd tend to agree with Beau on that. I mean, it's great. AV is -- autonomous vehicles offer a lot of promise. It could drop you off at work and go back and wait to charge at the right time.

But right now it's just so far in the future that I think, you know, making plans right now is a little bit premature. I think, you know, a lot of things need to be done before then. The
infrastructure has to go into place, and you know, I just think the decisions that we make right now should probably focus on it.

I think Alberto mentioned earlier this morning, you know, being involved, being engaged in that AV discussion so that it doesn't -- you know -- you don't get lost as we move towards autonomous vehicles.

But at the same time, I think for planning purposes now, the focus is probably on vehicles that have a driver in the driver's seat and maybe level two or level three vehicles.

MR. CRISOSTOMO: So the reason why I started off with that question is to try to establish some sort of bound for the uncertainty that the POUs will be working with in forecasting. As Bill from SMUD mentioned, he takes a simple proportion of the -- not -- I apologize for calling it simple, Bill. I didn't mean that.

A proportion of the 4.2 million target that ARB has published in the Draft Scoping Plan as the amount of SMUD's population, is that right? And so in order to understand the trajectory of the number of vehicles that they should be planning for and the distribution systems that they'll be accounting grid
impacts on, we have to understand the range of potential outcomes.

And I guess I'll direct my next question to Laura, as a modeler. You talked about how EVs can fill the belly of the duck. I'm forgetting who had mentioned having a duck bow. I've talked about beheading the duck before with vehicle to grid and demand response during non-peak time charging.

In terms of modeling this as a resource, what data are you collecting to be able to use this as the flexible load that you would like it to be?

MS. SUTLEY: Well, I should say, the modeling that we're doing in the IRP proceeding at the Commission is going to be using the same assumptions that the PUC is going to be using to put together their Preferred System Plan.

And I believe what they're planning to use, they haven't released their assumptions quite yet, but the draft I think says that they're going to be using the assumptions that E3 put together for the Pathways Modeling that ARB used.

So I did take a look at those assumptions before this, but it's pretty technical and I'm happy to point you to that site. So we're not -- I should be clear that UCS right now isn't coming up with
independent assumptions about the ability of individual EVs to contribute towards load shifting.

We're not going that. Because of the analysis that we're doing we want to make sure it's apples to apples with what the PUC is doing. But I do have something else to say about that, if I may, and it's actually a question for the automakers.

So obviously, you've heard a lot today about the potential synergies of electric vehicles and renewables on the grid if we can make sure people charge at the right time. And if they don't charge at the right time it's going to be a lot more expensive and probably result in more carbon, as well.

And I think everybody wants to avoid that, and so I agree that electricity rates are really complicated. They're definitely more complicated than, you know, dollars per gallon. And so because it seems to me that the car manufacturers and the dealers are the first time that someone interacts with -- the first time that a potential EV buyer asks questions about impacts of an EV on your pocketbook, what do you guys think is the solution there?

If we want to make sure that people are charging at times that are best for the grid and we
think that an economic signal is going to be necessary for that, how do we do that and make it not really, really complicated, and make it so it's easy enough that a dealer can describe the opportunity in one to two sentences?

And since Tesla has its own showrooms, have you guys come up with a way to break that down for potential EV buyers?

MR. WHITEMAN: Yes. It is. However, I mean, it's complicated, but -- and obviously, when someone walks into a store they could be from anywhere. It's -- I started my career at Tesla as managing our D.C. store and we'd have people from all over the country and all over the world coming through our store.

And back in 2012 it was one of our like eight stores. So you know, if we had someone come in from Tennessee, I couldn't help them too much, but if they came in from the D.C. Metro we could speak to what utility incentives were available for them.

And at the time, just to give you a specific example, PepCo was offering, it was like four or five cents off peak in the middle of the night to charge your EV. And so when people came in to pick up their car, the first thing -- one of the first things that
we would do with them is go and set the timer on their computer.

So even if they got home from work at 6:00 and plugged their car, it wouldn't actually click on till 12:30 or 1:00 o'clock in the morning.

Obviously, rates change and our ability kind of dwindles as -- over that time.

But at the store level our Staffs are informed of their utility incentives in the area, to the best that they can be.

COMMISSIONER PETERMAN: As a quick followup question about that and I would like to hear Mr. Douglas' comment. So whenever I've gone in to buy a car, the car dealer types lots of stuff into a computer.

Can't they type something in that then pops out this database that says, here's your ZIP Code, here are your incentives? I mean, how hard can it be for us to put that together?

MR. DOUGLAS: The incentives are actually kind of the easy part, right? I mean, there's a plethora --

COMMISSIONER PETERMAN: For the rates.

MR. DOUGLAS: -- of incentives. But the utility rates, I would -- I can't -- and I've been on
many websites, I can't tell you what, like the -- our lobbyist in our office, he was looking to get a car a couple years ago and I said, oh, you should check out the Volt.

He lives in Davis. So he's a PG&E customer. And so he goes to the dealership and says, hey, how much will it cost me to fuel this. Like, no, nothing. He never found out, because you can't. He's a flat rate user.

So okay. Well, if you're flat rate it's a really bad answer to say, well, about the equivalent of paying $4 a gallon for gas or 3.50. I mean, that's a bad answer if you want to sell a car. And then if you go to time of use, well, I mean, I would challenge anyone in here within an hour to try to figure out how much it will cost to fuel a car.

I mean, it's just incredibly complicated, because it depends. PG&E has five different time of use rates, and it depends on, okay, what's the summertime rate. How does that customer use electricity or do they stay home, so they're using the air-conditioner.

So you know, would time of use work for -- so if they go from flat rate to time of use their bill may go up $400, and well, that's because they
moved from flat rate to time of use, and that's kind of attributed to their electric vehicle choice.

So I mean, it's not at all easy. As to what would be simple, I mean, what's simple for a salesman or a dealership to explain is, provided you charge between, pick something, midnight and 6:00 a.m. your rate will be 25 cents, 15 cents, whatever it is.

The breakeven point for a 40-mile per gallon car is about 25 cents a kilowatt hour. So pick something less than that, just so that they know that it's less than driving on gasoline. That's kind of - - because I fear that if people -- and we all know how the blogs work and the Internet works, that if people get these vehicles and they realize, wait, I'm paying more.

They said it'd cost like a dollar a gallon of gas. They're going to feel duped and then you get this backlash against the technology and the people that they backlash against are the manufacturers and the dealerships.

And so but it hurts all of us in trying to push this market forward to try to make it mainstream. Once everyone's on time of use, I mean, time of use rates are generally pretty low, but that's the kind of simple, so long as you charge
between midnight and 6:00 a.m. it's the equivalent of paying a buck 50 per gallon of gas, something that simple, not, well, let's see what your utility bill was for the last three months, and can you bring a couple months from the winter, as well; so something really simple. That's what we'd like to see.

MR. CRISOSTOMO: And low.

MR. DOUGLAS: And low.

MR. CRISOSTOMO: So I'd like to pivot a little bit, but continue the lines of incentives and education to Shrayas. For your -- the program you pointed out to the Plus Up, given the diversity of disadvantaged communities throughout the state, and the potential to use, per the POU's suggestions, the IRP as a way of collecting the types of market interventions that they're providing to the state and to help us track what is happening throughout the statewide service territories, how can we use the IRPs, in your opinion, to better geo-target and meet the goals of Plus Up and SB 1275, et cetera?

MR. JATKAR: Yeah. It's a good question, since that IRP development is sort of the main focus here today. And I have to admit that I'm still new to the development of those planning documents. So I apologize if my comments are not quite aligned with
what a IRP development process looks like.

But hopefully, there's some ability to expand what can be done there. So you now, I think one thing that I wanted to point out earlier, that again, I'm not sure how viable this is for an IRP development process, but you know, widespread Transportation Electrification is not only about meeting our climate targets.

It's also about improving air quality. And the Metropolitan Planning Organizations, local air districts are also responsible for air quality improvement. And so I think one thing is really about coordination and thinking beyond the utility itself, trying to work with other local and regional government entities.

And so I would encourage that kind of coordination in terms of thinking about how can, you know, investment in particular in infrastructure, how can that be shared amongst these various entities. And I'll just point out that our group and some others were involved in updating and revising the Regional Transportation Plan Guidelines that the California Transportation Commission adopted in January of this year.

And those Guidelines do call on the
Metropolitan Planning Organizations to plan for and invest in Transportation Electrification, and encourage them to do so. And so I think there you would find, hopefully, a willing partner in the planning and investment arena.

Another effort that, again, hopefully fits in with the IRP process and we've seen some progress on this in the San Joaquin Valley, is the synchronization or coordination of utility efforts to support low-income households.

So, So Cal Edison is working closely with Valley Clean Air Now in the Valley, and working to identify their care customers so that there's good targeting of low-income customers and making sure that they're not only accessing bill assistance, but also energy efficiency, renewable energy programs.

So those are a couple of ideas in terms of sort of on the coordination front that may be part of the IRP process. And a couple of other ideas, I guess, coming back to what I had talked about in terms of thinking beyond car ownership, is also, you know, thinking about, are the IRPs a place to begin piloting and calling out certain sort of experiments on electric vehicles.

You know, as I mentioned, there is pilots
just starting underway in Sacramento and Los Angeles on car-sharing, but I think ride-sharing also offers a lot of promise, and as somebody who has never owned a car, electric or otherwise, I'm a big proponent of transit.

And I think that it'd be really interesting to figure out how moving Ubers and Lyfts towards electric vehicles and partnerships between the transit agencies and those corporations to actually support greater use of public transit I think is something very interesting.

And I know that there's going to be a second workshop that focuses more on medium and heavy duty, but maybe just as a preview to say that, of course, we're interested in the electrification of transit, as well, and so perhaps there's some effort to bring the POUs, transit agencies and transnational corporations, otherwise known as -- or excuse me -- TNC actually is transportation network companies.

But those entities can actually work together to figure out how they can support greater transit and also greater EV adoption. And one last thought that I had that I'll share, as I mentioned again, there's a van-pooling program that's just getting underway in the San Joaquin Valley.
As I was thinking about more urban areas and POU territory like in Glendale, Burbank and others, there could be some interesting pilots for worker van-pools, and thinking particularly of custodial workers that come into office buildings at night that -- when transit service may not be available or really a viable option, you know, is there some opportunity for sort of a workplace, van-pooling system for those workers who tend to be low-wage workers where EV adoption may not be viable, even with the more and more offerings that are coming from the automakers.

MR. CRISOSTOMO: I want to pivot kind of a similar question that we posed to the POUss and something that the charging providers hit on just a little bit, around data around vehicles load shape. Are there opportunities for the OEMs to help inform the POUss load characterization efforts through partnerships or agreements to share information? What would be helpful?

MR. WHITEMAN: I mean, from Tesla, short answer is sure. Every time we install a new super charger we typically share our load profiles with whichever utility that we're working with so that we can adequately spec out the site so that we don't
hurt anything on down the line.

I mean, on the AC charging side it's a little bit simpler. It just comes down to whichever hardware is installed, and you have a kind of a flat line for however long the vehicle is charging. But you know, we're not too different from the other OEMs, in that we keep our information pretty tight. But to the degree that we can, we're very willing to share.

MR. DOUGLAS: Yeah. And I agree with Beau. I mean, vehicle information, there's some information that's contained in the on board diagnostic system, but I don't think that has any kind of load information that would be useful.

I think like Tesla, I think the automakers do coordinate somewhat with the utilities to provide information about where the vehicles are going. I believe that's true, but that's OEM by OEM, and I think someone had raised, and maybe it was Bill with SMUD, about coordinating with the DMV to get information about, because they have the vehicle and the vehicle types.

And then, you know, as far as the load shaping goes, we have the vehicle where you can set the timer, and I think all the OEM vehicles you can
say, okay, I want -- don't start charging before, you
know, midnight or 10:00 p.m., and then stop charging
after 7:00 a.m. or 2:00 p.m., whatever it is. So you
can do that on the vehicle.

And then, you know, there's also EVSEs, that
charges themselves, that I think some have to have
settings and can be controlled. So I don't know what
-- how that works. And then, of course, I think Bill
had mentioned as far as, you know, actually taking
network control, the utility control and the
infrastructure is pretty costly.

So, you know, on the vehicle side we can do
a timer, but you know, I don't think the vehicle
receives signals from anything to say, you know,
charge now or, you know, charge in two hours.

MR. CRISOSTOMO: Before turning it to the
Commissioners for some final questions, I'll open it
up to the panelists just generally. Are there any
suggestions for the TE Guidance that I had developed
with Tim in providing guidelines for the TE reports,
anything that would be helpful or in addition to what
was proposed?

MR. WHITEMAN: I think if I -- I think what
you've provided is great. There is such a -- there
is a need to bring EV infrastructure to parts of the
population that are difficult to serve, either as
individuals or even as OEMs.

Tesla is not alone in its financial support
of infrastructure for its owners. Virtually every
OEM is putting money into infrastructure in some way,
shape or form. And on the level two side it is so
difficult when you're a renter, even in some
scenarios, if you're a condo owner with a big share
parking facility, if you park on the street or if you
are a member of a disadvantaged community, even if
you have access to affordable EVs, if you're renting
and don't have the ability to pay, you know, however
many thousand of dollars it costs to bring this to
your home, an EV just -- it's not going to be an
option.

So utility engagement here is so very
welcome, and I think that the proposals that we have
seen so far will go a long way in bringing the entire
market along.

MR. DOUGLAS: Yeah. And I think, you know,
the infrastructure is critically important. And I
guess if I were kind of ranking the importance,
workplace charging is critical because it provides
two things.

One, it extends the range of the vehicles,
but probably, just as importantly, it provides this consumer awareness, because you spend a lot of time with your co-workers, and when you see them charging you talk to them about their vehicles.

And so you get this multiplier effect from that workplace charging. MUDs, multiple-unit dwellings, those are critical, because just as Beau said, if you don't have a charger it's just not an option.

And then one thing that I think is a little bit -- you know -- a large portion of even pure battery electric vehicle drivers use 110. So they just use level one charging at home and it's a huge percentage. It's like 60-70 percent.

And which is fine, but you know, we're kind of moving from -- hopefully, we're moving from this early adopters where they're willing to be inconvenienced a little bit like myself, we want to move that to the mainstream, where you know, they don't really want to compromise on anything.

So that level one, that eight, 10 hours charging, really doesn't work if you went out on a Saturday, did some errands and you come back home and, okay, well, you got, you know, 40 miles left. So you know, I think level two at home is kind of
important, too, because it's an investment.

And once you've made that investment then, you know, it's there and it's available. And I think it would encourage people to -- who if they don't have it, they have no stake. They let that lease go and they go back out and buy a gas car and they're done with it. It was a great experiment.

But if they have a level two charges, then maybe it's -- like myself, it's like, okay, well, I have the charger, I may as well use it. So it's a little easier. So I don't want just general home charging to be lost because too many people use level one.

And not that it's a bad thing, but I think when we want to move to the mass market, that's going to be important.

MR. WHITEMAN: And if I can jump back in real quick, but something -- and I'm glad you brought this up -- that I have been bringing up in the conversations that I've been having is the notion of expanding the definition of a workplace.

All too often when we talk about workplace charging we're thinking offices, places that we're sitting. But when we bring in disadvantaged communities let's talk about people who are working
hourly retail jobs, who are working at fast food restaurants, all of these folks who could be driving EVs, but don't otherwise have access to charging.

And how do we get those types of workplaces excited about charging hardware on their properties, as well, is going to be really important.

MR. JATKAR: Thanks. Yeah. I guess the one point that I would hit on is just calling out more emphasis on disadvantaged communities or low-income Californians, and particularly in the education and outreach activities that the POUs would be engaging in.

You know, I think it's important to note that, and I think somebody had mentioned this on the last panel, that not all communities are the same. And so it is important to not just treat disadvantaged communities as some monolith.

There are different needs and different desires, as well. And so just to call out that the ARB has recently published its Draft Discussion Document on Barriers to Low Carbon Transportation that low-income Californians face, and that's beginning this process of really doing sort of deeper dives in specific communities to understand the needs in specific disadvantaged communities across the
state.

And I also just want to highlight that I think it would be a really interesting idea to figure out how we can create sort of EV ambassadors among disadvantaged community residents who have started to adopt EVs. The testimonials that I've read cut across a lot of issues that have been brought up in terms of the benefits of EVs.

You know, cost-savings is of course critical, but there's also things that we don't often think about. You know, people have more reliable transportation to get to work, or for work. And so people, you know, grandchildren being taken out by their grandparents who now have access to a vehicle is one of the testimonials from the Financing Assistance Program that ARB has.

So being able to capture those, and I think, you know, spreading that by word of mouth I think is actually perhaps maybe the most effective way at really ramping up EV deployments across the state. And so I think figuring out a way to involve people who have begun to adopt these kinds of vehicles will be really helpful.

And sort of another point that I wanted to make earlier, which I'll just end with is, while
quantitative data is really important, I think these kinds of testimonials from EV drivers also makes a really big different.

And in particular, the kind of arenas that I'm more involved in, you know, in the Legislature when we're talking about securing dedicated funding for incentive programs, those kinds of qualitative assessments of the benefits that EVs have provided to individuals makes a big difference, in addition to the quantitative data that we can provide on emission reductions and cost savings.

MS. SUTLEY: The one thing that I'll suggest is you have in here a list of rate design modifications to encourage customer electrification, and I think that those rate design modifications are only going to be successful if the POUs have a pretty robust plan for educating and reaching out to their customers.

And so being specific about making sure that they have a plan to do that. And then also, just from this conversation, plan the extent to which POUs have plans to work with the dealers that have EVs in their service territory to make sure that those dealers feel like they have the best, most clear, concise information.
If they're asked from a potential EV customer, what is this going to do to my electricity bill, they can have a straightforward answer. I think the POUs have a large role to play in helping the dealers be better communicators on that.

THE CLERK: I think you're channeling our Plug-In America representative who wasn't able to come. Thank you.

Commissioners, any final questions or thoughts before we turn it to broader, general questions?

COMMISSIONER PETERMAN: Thank you very much. A lot of good food for thought and a lot of things for me to think about in terms of the IOUs. So appreciate the discussion.

COMMISSIONER SCOTT: And I'll echo that. Thank you.

MR. CRISOSTOMO: So Heather.

MS. RAITT: Okay. I just want to thank everybody, and I think we're ready to move on to the next part, which is the public comment.

COMMISSIONER SCOTT: We are. I think were we going to do the Commissioners' closing comments first, and then public comment, or --

MS. RAITT: If that's your preference.
COMMISSIONER PETERMAN: I don't care. I think those were my closing comments.

COMMISSIONER SCOTT: Oh, okay. Good. I have some additional closing comments. Maybe I'll just go ahead and make those now before we lose any of the other folks that are here in the room. First of all, I know that we had a few folks on the phone who had some questions.

I'm sorry that this wasn't really set up as a question and answer session, but if you send those questions to us we will do our best to get answers to you. I want to just say, thank you so much to Noel for his leadership on this, and also, acknowledge Tim Olson and Mike Sokol, the FTD team and the SB 250 team.

There's, as y'all know, a lot of moving pieces that are going on here and coordinating that and putting it all together in kind of succinct chunks so we can kind of focus on a piece at a time, and then put it all together is quite an effort, but they're doing a great job with that.

I want to highlight for y'all that in two weeks on April 27th we're going to do a focus on the medium duty, heavy duty sector. We broke them apart because we think some of the medium, heavy duty
issues and topics sometimes have a different set of
people, and it's a little slightly different set of
issues and topics.

And so we really wanted to make sure that we
had a chance to hone in on that. It'll be the same
type of format as we did today, but more of a half-
day session, and it's -- we'll be looking at the
Draft Guidance language, and are there things that we
need to include in there that are specific to medium
duty, heavy duty, that aren't in there?

Are there things that we have included that
aren't useful? You know, the same kind of discussion
but really focused on the medium duty, heavy duty
sector and the infrastructure that goes along with
that.

I want to say to Commissioner Peterman and
Amy and team, I'd love to trade notes with y'all as
you get going on the component for the smaller IOUs,
because I think there probably will be a lot of
overlap between that work that you are doing with the
smaller IOUs and the work that we're doing at the
Commission with the POU.

And of course, we are coordinating well with
one another. I know our teams are talking to each
other, but I'd love to be able to have a little bit
of that dialogue with you, as well. And thank you so
much for joining me here today.

It's always a lot of fun to get to work with
you, my fellow Commissioner Peterman, from the PUC on
topics with -- that we overlap. So I'm really glad
to get to share the dias with you. And then I just
wanted to reflect back a few things that I heard
today.

You heard from Mike kind of a schedule, and
I just wanted to reiterate that a little bit so that
it's clear how everything fits together. As y'all
know, we put together some Draft Guideline topics
that were associated with our February 23rd Workshop
that had two pages of bullets on Transportation
Electrification.

What we're doing right now with the document
that you saw from Noel a few days before today's
Workshop is transforming those topics into the
Guideline language, the language that will actually
go into the Guidelines.

Mike Sokol will then take that
Transportation Electrification language and drop it
in with all of the rest of the language that we're
developing for the IRP. So you know, the renewable
portfolio components, the energy efficiency
components, all of that will come together in one
document that we will then present as a draft to
y'all to discuss at our May 25th Workshop.

And then the idea behind that is to get that
draft out before you, have you have a chance to look
at it, get us your comments. We will work, the
Energy Commission, to finalize that and bring it to
the full Commission for consideration at our July
12th Business Meeting.

We're working really hard to stay on that
time line, because as y'all probably know, many of
the POUs requested, oh, probably about a year ago,
that they need at least 18 months with the Guidelines
to be ready for the IRPs, which are, the first round
is due on January 1st of 2019.

So we're working really hard to try to hit
that 18-months for y'all. So we really appreciate
the partnership and the collaboration. Thank you for
rolling up your sleeves and giving us your best
thoughts in this area, especially on Transportation
Electrification.

A couple of things that I wanted to get your
feedback on or ask specifically on the Transportation
Electrification side is, there were a couple places
where folks mentioned some concrete examples of --
oh, you mentioned information that you're already submitting, but in different proceedings or procedures.

So if you have concrete examples of that and what it looks like so that we can kind of see it and say, okay, well, let's have it look like that, or let's recommend that it look like that in the IRPs, that would be great.

Anything concrete and specific that you have for us, we'd really be looking forward to that. Same, we heard trying to avoid duplication. So if there are things that seem repetitive or duplicative, please be sure to point that out specifically to us.

I heard a little bit of talk through the various panels about the timing of the type of information that we would like to see in the IRPs. And so to the extent that you can say, hey, this is -- and Commissioner Peterman picked up on this, as well, with her question -- in terms of, okay, what do you have today.

What do you think you might have in two or three years; what do you think you might have in five years, and just giving us a good sense of the timing for when certain pieces of information might be available, I think will be helpful for us as we are
thinking about this.

One other thing that would be helpful is how to specifically address the disadvantaged communities. And we heard some about that on our panels, but I think that's another place where it'd be great to have good thoughts and comments there.

So anyway, those are some of my high level thoughts from today. I really want to say thank you, again, to all of our panelists, to Noel and Tim for setting this up, to Commissioner Peterman for joining me here today.

It really does kind of take a village to put all of this together, and so I appreciate the partnership, the collaboration and the time that all of you have spent on this and that I hope you will spend as you put together some written comments for us to consider as we hammer out these Draft Guidelines.

So oh, and of course, we have to thank the IEPR team who always does a fantastic job for us, getting these meetings running smoothly and they just do a fantastic job at that. So thank you. Okay. So with that, let me turn to our public comment.

I just have three blue cards here in the room, and if you're on the WebEx and would like to
make a comment, please make sure that you've raised your hand so that the Staff will know to acknowledge you.

First, I have Steve Taber, and Steve is followed by Sam Saxena.

MR. TABER: Thank you very much, Commissioners, for sticking around. It's been a long day. My name is Steve Taber. I'm with eMotorWerks. I want to talk today a little bit about how to attract private capital into the task of paying for the deployment of charging infrastructure.

We have goals as a state, a million EVs by 2020, a million and a half by 2025. There is not enough money in the public coffers to pay for the deployment of infrastructure by itself. So the question is, how can we use the public funds and public policy to leverage private capital into that task.

I've written a detailed white paper on this, and it's in the docket. I will command your attention to it. I'll just briefly summarize it right now. First of all, eMotorWerks is, we're based in Silicon Valley.

We make -- all manufactured in California -- we make EV chargers. We also maintain an IOT
platform for managing -- the chargers are fully grid integrated. We maintain an IOT platform for managing charging in the entire fleet of chargers.

We license that platform to other manufacturers of chargers and to manufacturers of EVs. So together with our channel partners we currently have a market share of somewhere around 50 percent in the residential charging sector.

Forgive me. I had some slides, but I was told I was not allowed to give them. So I'm trying to --

COMMISSIONER SCOTT: But please make sure they're in the docket, you know.


COMMISSIONER SCOTT: The summary's good for us. We'll read the presentation.

MR. TABER: Okay. So the big picture here is that if properly deployed, public funds can be used to leverage private capital, attracting private capital into the deployment task at a ratio of somewhere between two to one, or as high as five to one private funds to public.

So for example, just hypothetically, a $10 million outlay of public funds could be used to attract as much as $50 million in private money into
the deployment task, deploying as many as 67,000 residential chargers and adding as much as four terawatt hours of energy services to the grid per year.

This is accomplished by capturing revenues from the CAL ISO wholesale markets and then basically using project financing to front load those monies to provide the capital for the deployment of charging infrastructure.

In a typical scenario, there's an example analyzed in the white paper, I take one charger with a daily charging load of 12 kilowatt hours on a time of use tariff. And with all due respect to my colleague here, I don't think they're that complicated, with our platform and with our smart phone interface, the managing of the charging in concert with the time of use rates is fairly straightforward.

Now, this typical EVSE generates between 200 and $300 per year in revenue out of the wholesale markets. So the lower number is with current time of use rate, if the time of use, off peak period is modified to include the belly of the duck, then that number gets up to closer to $300 per year.

Now, this analysis does not include other
benefits such as grid upgrade deferrals and things of that nature. This is just revenues from the wholesale markets. So this stream of revenues, then, can be leveraged to attract private capital, and there are two models analyzed in the white paper.

One is venture financing and the other is project financing. Venture financing is risk capital. Those are the people that can stand to lose the money and don't mind taking a gamble. Project financing is risk mitigate financing.

I'm sure you're familiar with it. It's widows and orphans type of financing, and that attracts a much lower return on capital. So in these two examples, our exemplary charger can -- with venture financing -- can leverage at a ratio of about three to two, private money to public money, and with project financing can leverage at a ratio of about five to one, private money to public money.

COMMISSIONER SCOTT: So I'm going to ask that you wrap up, but we will -- we have your white paper and the presentation and we'll definitely take a look at it. But if you have a summary --

MR. TABER: One more minute then, if I may.

To attract -- may I, one more minute?

COMMISSIONER SCOTT: Can you just do the
MR. TABER: I can, certainly. To attract project financing we have six recommendations. First of all, enable long-term fixed-price PBAs for grid services. Secondly, allow DRPs to participate in the wholesale markets with no minimum resource quantity. Currently, you have to have a 500 kilowatt minimum. Since chargers are a few kilowatts each, that requires a large aggregation. That means a substantial number of -- that means all participants are going to be delayed and many participants are going to be stranded outside the program.

Third, direct the LLCs to share the benefits that they are accruing. Do not let them free ride. Fourth, set aside a substantial portion of whatever public funds are available for the residential sector, where you get a high bang for the buck.

Five, spread the incentives broadly. If properly structured, as little as $150 per charger is enough to employ a lot of chargers and have a very attractive value proposition. And finally, minimize friction in the customer enrollment process, which right now is a nightmare. So in this regard, Commissioner Peterman, the Click Through Working Group is doing God's work. Thank you very much.
COMMISSIONER SCOTT: Thank you.

COMMISSIONER PETERMAN: And Commissioner, I will note that eMotorWerks is the first aggregator of EV vehicles into the Demand Response Programs, and so they have this experience that they are sharing. So thank you very much.


MR. SAXENA: Hello, Commissioners, everyone. My name is Sam Saxena. I'm a scientist at Lawrence Berkeley National Laboratory. In the electricity sector California has pioneered demand side energy efficiency. Some call this the Rosenfeld Effect.

I'm here today to share with you how we can create a much-needed Rosenfeld Effect in the transportation sector. Berkeley Lab has developed MyGreenCar, an app for car buyers. To understand what the app does, put yourself in the shoes of someone looking to buy a car.

Maybe you want to make the greener choice, but you're not sure if an EV is a viable option for you. For your commute and your outlier trips, will range anxiety be a problem? How will traffic, hills and weather affect things?
Do you need an expensive charger at home? Do you need a charter at work? How will your electricity costs compare against your gasoline costs for a comparable, conventional car? All these questions are difficult to answer for car buyers.

As Commissioner Peterman said, it would take over an hour. Uncertainty is a major barrier to EV adoption. MyGreenCar eliminates these uncertainty barriers. For a car buyer, just download the app, drive like normal in your current car and the app takes care of all the hard work to give you actionable information on the greenest cars for you.

For POUs, MyGreenCar gives an inexpensive data collection tool to measure the needs of car buyers and drivers without deploying any hardware. The app is built on top of Berkeley Lab's Vehicle to Grid Simulator that CEC's own Demand Analysis Office is using to forecast EV load growth in California.

By providing visibility into when people are looking to buy cars and how they travel, MyGreenCar not only gives POUs the ability to forecast and plan when EV charging is needed -- pardon me -- where EV charging is needed, but also to see when it is needed, based on when people are buying cars.

Finally, and perhaps most importantly,
MyGreenCar can give POUs the ability to measure success towards SB 350 goals. User throughput and impact on car buyers is easily measured in the app. the resulting fuel and greenhouse gas savings are easily projected.

To summarize, MyGreenCar is an app for car buyers. It eliminates the uncertainty barriers to accelerate EV adoption. It will revolutionize how [sic] EV outreach and education, and it will provide an inexpensive tool for collecting data, forecasting and planning for Transportation Electrification.

It will allow POUs to measure progress towards SB 350 objectives. Most importantly, MyGreenCar is ready to deploy today. It can rapidly scale to millions of car buyers. It will produce early, measurable and highly visible progress.

At Berkeley Lab we aim for MyGreenCar to become California's app for car buyers. We invite the Energy Commission and POUs to adopt MyGreenCar in their Transportation Electrification efforts. We look forward to working with you to build on Art Rosenfeld's legacy by applying MyGreenCar to create the much-needed Rosenfeld Effect in the transportation sector. Thank you.

COMMISSIONER SCOTT: Thank you. I've got I
think it's McKinley Addy, followed by Jonathan Changus.

MR. ADDY: Commissioners, good afternoon. Forgive my voice. I think I'm coming up with something. But I'm McKinley, McKinley Addy. I'm with ADTRA, a virtual integrator of low carbon, high efficiency technologies at scale, using private capital.

Thank you for the opportunity to comment. My comments cover two topics, perhaps three. But first, I'd like to commend the Energy Commission Staff for their work in exploring how they see Transportation Electrification unfolding as part of the POU IRP process.

I also wanted to acknowledge publicly the excellent work that CPUC Staff and Commissioner Peterman did in the September 2016 SB 350 ruling for IOUs' pilot projects. The reason that that ruling is so important is because it links the SB 350 Transportation Electrification benefits to the State Alternative Fuels Plan, and the related Joint Agency Report on Reducing California's Petroleum Dependence.

Other than through the LCFS indirectly, the AB 1007 Report, the State Oilfields Plan and the Petroleum Reduction Plan lacked an implementing
mechanism. SB 350 provides that mechanism and more importantly, SB 350 represents continuity of state transportation energy policy and predictability for investment decisions.

And we would recommend that wherever possible, to link advancing SB 350 targets to the AB 1007 and 2076 outcomes to highlight this important continuity.

My second comment is about getting the cost picture for EVs right, because it can affect EV penetration forecasts, which in turn can impact TE, or Transportation Electrification load and utility investment decisions.

One cause dynamic that needs attention we believe is interaction between the unrecovered manufacturer EV cost, the incremental cost to consumers and available public incentives. Several reports suggests that GM and Nissan lose close to $10,000 -- 8,000 to $10,000 for each EV sold, and perhaps higher costs for an EV that might be coming onto the market soon.

If manufacturer losses were factored into EV prices what would the true price of passenger EVs be? What would the level of incentives need to be to support the EV penetration levels to realize
California's EV deployment targets for fuller priced EVs?

Slide nine of Bloomberg's presentation noted that without incentives EV total cost of ownership isn't cost competitive with gasoline passenger vehicles under current battery price points. In the absence of incentives for EVs will the adoption rates be less?

Would utilities' investments be similarly affected? It would seem that business model innovation and financing models innovation, which Commissioner Peterman asked about, assume additional importance under these circumstances.

COMMISSIONER SCOTT: I'm going to have to ask you to please wrap up.

MR. ADDY: Yes. TE success is important to California's broad transportation energy goals across vehicle classes and fuel. So we hope close attention is paid to the EV cost dynamic and the strategies required to address them. Thank you.

COMMISSIONER SCOTT: Thank you. And we always read the comments that are in the docket. So please make sure that you have your full thoughts in the writing in the docket and we'll be sure to see those, just like the gentleman before you's
MR. ADDY: Thank you.


MR. CHANGUS: Hi. Jonathan Changus, Northern California Power Agency with a very quick request. The two weeks, just a modest extension on the written comments. I believe we had a 28th and the docket period, I believe some of us are spending about 50 percent of our workdays over the next two weeks at the CEC or some other agency.

So if we could just get a modest extension to I believe like May 2nd or whatever that -- two weeks from today would be very, very much appreciated, so we get good response from our organizations.

COMMISSIONER SCOTT: Sure. Let me check in with Chair on the timing. The Chairs kind of set the timing to make sure that we hit that May 25th Workshop. So let me circle back and we'll be sure to give you a response on that.

So that's all the blue cards I have from folks in the room. Do I have any commenters on the WebEx or the phone?

MS. RAITT: Well, I do have a couple comments from WebEx that came in this morning --
COMMISSIONER SCOTT: Okay.

MS. RAITT: -- that I can just read to the record.

COMMISSIONER SCOTT: Yes, please.

MS. RAITT: It says, this is from John Shears at CERT. Unfortunately, I have multiple conflicts today and can't cover the rest of the Workshop. So I will be traveling this afternoon.

A question that I have is, given that the fuel cell electric vehicles are part of the state's ZEV action plan and that demand for renewable hydrogen will be growing rapidly, see AB 8 report, what role do the utilities and the agencies see for renewable hydrogen connected to the duck curve?

I'm thinking in terms of benefit load during period of peak renewables or during the duck's belly, when there can be low or even negative pricing, to generate EH-2 that can be stored and use either in stationary fuel cells to help with periods of peak demand, e.g., during the ramp of the duck's neck, or to fuel FCEVs.

This applies not only to LD FCEVs in the near term, but also extends to MD and heavy duty FCEVs in the mid and longer term. So I think that's basically a comment, but I will just add briefly to
say that we do have a couple of upcoming workshops
that will also touch on renewable hydrogen.

We have the May 11th workshop, which is
going to look at renewable hydrogen as one of several
potential solutions to helping integrate variable
resources, and then later, we have the June 27th
Workshop, which will go more broadly into renewable
hydrogen. A second comment --

COMMISSIONER PETERMAN: I just want to make
a comment about that.

MS. RAITT: I'm sorry. Yeah.

COMMISSIONER PETERMAN: Which is for the
investor owned utilities where we focus the first
Transportation Electrification plans is on electric
vehicles, but we're very supportive of the state's
broader commitment to ZEVs and to fuel cell vehicles,
and it's a question that we are thinking about and we
look forward to input for our utilities about how the
PUC and the utilities can be supporting fuel cell
vehicle deployment.

And one of the things, as I understand it,
one of the main drivers of cost for hydrogen
production is electricity, and so there's various
ways in which our Commission could engage on this
issue.
On the broader issue of hydrogen vehicles, I'm excited to see further results from -- SoCalGas, has a power to gas pilot. So they're our first utility to really be focusing on the production of hydrogen and thinking about the nexus of their work in the electricity sector with hydrogen.

So it's an area which I'm interested in and I continue to see feedback on, but our most immediate opportunities as a Commission is centered on EVs.

MS. RAITT: Okay. The second one is from Indra Singhal. I'm sorry if I'm -- I'm sure I'm mispronouncing that. She has questions that I think actually we would just try to address offline, but I'll go ahead and read them.

During Noel's PowerPoint, what are the POUs and CECs doing to help end-users of EV purchase decision processes? Second one, during the presentation on the future penetration ZEVs, for the representatives from Navigant and Bloomberg, is there -- the question is, is there concern that changing federal policies may derail these goals? What is California's stance to counter regression? So.

Anything?

MS. RAITT: I think Alberto Ayala answered that pretty clearly in his presentation this morning.
So I'd let that stand on the record as the answer to that question.

MS. RAITT: Okay. Great. And does anyone else have their hand up on WebEx?

MR. CRISOSTOMO: I guess to immediately respond to the influencing PEV adoption, Commissioner Scott, could you mention the Voucher Program that was just approved during the --

COMMISSIONER SCOTT: Go ahead. Do you want to talk about it or you want me to?

MR. CRISOSTOMO: You, I think you provided the NPR sound byte. So it might be appropriate for you --

COMMISSIONER SCOTT: Oh, all right. Happy to do that. Well, so basically, at the Energy Commission on the infrastructure side what we've done is put together a Voucher Program that's similar to what the Clean Vehicle Rebate Project looks like, so that will hopefully get the infrastructure moving out there a little bit faster.

People will be able to apply to the program to get a voucher to then refund the cost of putting that infrastructure in place. We just recently awarded that. It went to CSE. So there's some -- that was a competitive solicitation and they won it,
but there's some nice synergy there between them running the CBRP Program and then also running the Voucher Program.

And they are currently designing, putting in place all of the components, because of course, there's key things like making sure infrastructure gets to disadvantaged communities and other things like that, that will be overlays.

It's not just a free for all on the voucher money. So that is there. We just approved -- the Energy Commission in full approved that at the Business Meeting last week.

MS. RAITT: It's last week?

COMMISSIONER SCOTT: Yeah. Thank you. It's exciting. Any other comments on the Webex?

MS. RAITT: I think that's it.

COMMISSIONER SCOTT: Or the phone? Okay. With that, then, we are adjourned. Thank you, everyone, for a great day.

(Adjourned at 4:28 p.m.)
REPORTER’S CERTIFICATE

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

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