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BEFORE THE
CALIFORNIA ENERGY COMMISSION

In the Matter of:	)	Docket No. 17-IEPR-07
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2015 Integrated Energy Policy Report (*2017 IEPR)*	)	Integrated Resource Planning

IEPR Commissioner Workshop on
Integrated Resource Plans
Medium and Heavy-Duty Vehicle Sector

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

THURSDAY, APRIL 27, 2017
1:13 P.M.

Reported by:
Peter Petty

APPEARANCES

CEC

Commissioners Present

Robert B. Weisenmiller, Chair, Lead Commissioner
Janea A. Scott, Commissioner, Transportation

CEC Staff Present

Heather Raitt, CEC, IEPR Program Manager
Noel Crisostomo
Tim Olson

Presenters

Naveen Berry, SCAQMD
Tony Brazil, CARB
Eric Seilo, SCE
Chay Thao, SJVAPCD

Panelists

Adenike Adeyeye, EarthJustice
Kanok Boriboonsomsin, UC Riverside
Chris Cannon, Port of Los Angeles
Hannah Goldsmith, CalETC
Fran Inman, CTC
Barry Moline, CMUA
Marvin Moon, LADWP
Bill Van Amburg, CALSTART
Lowell Watros, Redding Electric Utility
Bill Westerfield, SMUD

Public Comment

1. Lisa McGhee, San Diego Airport Parking Co.
2. McKinley Addy, AdTRA
3. Matt Williams, CARB

I N D E X

P R O C E E D I N G S

APRIL 27, 2017 1:13 p.m.

MS. RAITT: -- everybody for your patience. Good afternoon. Welcome to today's IEPR's Workshop on Publicly-Owned Utility Integrated Resource Plans for Transportation Electrification for Medium and Heavy-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 Staff to Roosevelt Park, which is across the street diagonal to the building.

Also, please be aware that we are being broadcast through our WebEx Conferencing System, and so parties are being recorded. We'll post an audio recording in about a week and a transcript in about a month.

We do have a very full Agenda today. So I'd like to remind our presenters, please stay within your allotted speaking times, and try not to be too obtrusive, but we will give you reminders about timing.

And we will have an opportunity at the end of the day to do public comments, and parties are

limited to three minutes per speaker. Go ahead and fill out a blue card, which is at the entrance, and you could give it to me or the Public Adviser there, Rene. Thank you.

And for those on WebEx who'd like to make comments, just raise your hand and let our WebEx Coordinator know you'd like to comment. Materials are available at the entrance to the hearing room and posted on our website, and written comments for today's Workshop are due on May 19th.

I just wanted to make sure people are aware of that. That's an extension from the original due date of May 5th for this Workshop. The Energy Commission put out a notice earlier this week extending the comment period for both this Workshop and the workshop on April 18th, both related to the IRP transportation issues.

The notice explains how to submit written comments, and with that I'll turn it over to Chair Weisenmiller for opening remarks. Thank you.

CHAIRMAN WEISENMILLER: Thank you. I'd like to thank everyone for being here today, and welcome you to the I'm going to say in some respects the second part of the conversation we started on Transportation Electrification.

And you know, this is a very important topic for us. You know, if you look at greenhouse gas emissions in the state it's about 40 percent comes from the transportation sector. If you look at air pollution, again, it's a very large number. It's more like 80 percent.

And at the same time, when you look at our economy, particularly in Southern California, a lot of our economy is built around goods movement. You know, that's 20 to 30 percent of the economy there. So we really need to figure out a way to address the pollution from transportation, and certainly, electrification is one way.

The other part of it is just, you know, when you look at the scientific side, certainly, the south coast has done more than a few. We're really talking about right around the freeways, you know, is where a lot of -- you know -- if you live close enough to freeways there's a pretty significant chance your children are going to get asthma.

So again, there's real public health benefits of this electrification, but we need to do it in a way that really helps us drive forward on the economy and -- down there. So again, really looking forward to the conversation today.

I was looking at the earlier one on light-duty. Now, we're looking more at medium and heavy-duty vehicles. Commissioner Scott.

COMMISSIONER SCOTT: I will just say good afternoon and welcome. I didn't have a chance to hear all of the Chair's comments, but I'm sure that I echo them, as well, and I'm looking forward to our medium-duty and heavy-duty electrification discussion today.

MS. RAITT: Great. So our first speaker is Tony Brazil, from the California Air Resources Board.

MR. BRAZIL: Thank you for the opportunity to be here. I know that you cover a number of these topics. I do have some slides for the record. I will skim over to save time. My name is Tony Brazil. I am the Chief of the Transportation and Clean Technology Branch.

Our focus is on heavy-duty regulatory policies. Well, I'm representing the division where we do have funding policies. I'll try to cover some topics that I think are relevant to the discussion today.

First slide, please. This is background and I think you've pretty much kind of touched on some of the topics. We have a number of goals to meet and

Transportation Electrification is part of that. Traffic congestion and other things are things we're trying to address, as well.

Next slide, please. This simply lays out the targets that we have to meet and that we're focused on. And I think the point here is there are multiple sectors, different ways to address it. And Transportation Electrification is clearly part of that plan, and so we do have a number of programs to further the market, including regulatory strategies that we'll cover momentarily.

Next slide, please. So this might look a little familiar to you. You probably saw it on the light-duty discussion. All the reasons that we need medium and heavy-duty Transportation Electrification are very similar to what we need for light-duty.

So we're really echoing many of the same points. So I'm not going to go over them in the greatest detail, but again, the reductions we get from the transportation for light-duty and heavy-duty fuel displacement, and whether it's heavy-duty or light-duty, are all achieving similar goals.

And we're looking for, again, the trifecta of emission benefits in modifying the way our transportation energy is used. And so we are looking

to leverage a number of programs, and we've been obviously participating here, working with the PUC and others to align our policies.

Next slide, please. And this is simply a graphic image of the various items that are ultimately interrelated that I'm sure you're familiar with. Next slide.

And for a little bit of background on our sustainable freight strategy, we've established some targets of 100,000 zero emission vehicles and equipment in the freight sector by the 2030 time frame. As part of our regulatory structure and funding policy we are looking to meet -- have the best strategies to be able to meet those kinds of targets.

Next slide. So zero emission vehicles, a key role is that they do have high vehicle efficiency. We actually have some new information that's I think relevant about the efficiency gains data. I will have some detail here.

And obviously, you do recognize the grid benefits associated with it. So I will focus on the three regulatory efforts that are actually underway at this time to provide you a little bit of background on what we're doing there.

Next slide. And I do want to touch on some overlay issues that do relate to and actually bring forward the data information that I was referring to. So next slide, please.

The low carbon fuel standards are fuel policy to encourage the use of low carbon fuels, and that program does provide a direct financial benefit to users who use electricity as a transportation fuel.

The efficiency ratings that are used for that establish how many credits you receive and improve the payback for a vehicle. It's a straightforward process. It benefits directly the fleet owner. They receive the credits. They can sell the credits. A little bit different than how light-duty works in this arena.

Next slide. Because we were looking at updating the regulations and the programs being updated, we actually found -- we found more recent data on apples to apples comparisons of drayage trucks, buses, partial delivery trucks operated on test cycles that were electric vehicle and a comparable diesel vehicle to look at how those efficiencies might be different among all the categories.

We even had some in-use data and found that we have very similar results. On the next slide I think you'll have the graphic representation. So what this shows is that if you know the average speed of your operation of your vehicle and your fuel consumption, the efficiency of an electric vehicle compared to it actually gets better at lower speeds.

And the explanation is simply that as you operate in a stop and go operation you have a lot more idling, a lot more coasting. Internal combustion engines continue to use fuel, where electric vehicles don't. Plus, the regenerative braking and other things provide you benefits.

So what we thought -- we were surprised about is that the relationship is very strong, regardless of the vehicle's size. This applies to 12-passenger vans, smaller, partial-delivery trucks, drayage trucks and buses that are heavy-duty Class 8.

And the other point I wanted to bring to your attention is on the bottom left, are the little arrows and the types of trucks. If you have a trash truck, a delivery van, an urban bus, a yard truck, they're all in that category of 13-mile per hour averages or lower, or a high percentage of them.

And so the efficiencies -- well, the efficiency

ratios that you see are higher than what we've used in the past. Next slide kind of provides a summary of what the implications of this are. First, it seems to be universal for all weight classes.

Second, the GHG emission benefits for trucks would in essence be nearly twice as high as what we have previously used in our estimates. I think that's a substantial finding. This paper is available for comment.

We are seeking in feedback and if there's additional data we will update that, but we do expect it to be reflected in our Scoping Plan, LCFS policies going forward. It also actually provides a better comparison of electricity to diesel fuel use in this example, because frequently, people compare a vehicle operation -- stop-and-go operation to a vehicle operated on the freeway, and that's not an actual, valid comparison. So this actually makes it easier to be able to do that analysis for a range of items.

So next slide, please. So not to get into the regulations. We are working on an innovative clean transit regulation. We've been at this for a number of years now, working closely with the transit agencies to deploy zero emission buses, enhance mobility, incorporate shared mobility.

And the end goal is to have an entire zero emission passenger transportation by the 2040 time frame. We do believe that's feasible. We're trying to find what's the best way to do that and how to achieve that, and obviously, electrification of both light-duty and heavy-duty is part of that.

Next slide, please. Zero emission buses are further ahead in terms of market commercialization than trucks. I do want to provide a little bit of hindsight there. There are now more zero emission bus manufacturers than there are conventional bus manufacturers.

A number of them are locating here in California and bringing manufacturing jobs, as well, which is a positive and doesn't frequently happen with the standards of a proven place for engine manufacturers.

Buses are now available in a wide range of categories and types, double-deckers, commuter-type buses, transit buses. Recently, some shuttle buses have become available and there's overlap of the shuttle buses and other types of trucks.

Fuel cell electric buses do have similar range to conventional buses and a number are being operated and deployed, as well. These successes

we're seeing here, including training and other educational items that transit agencies are leading, will ultimately benefit other heavy-duty sectors.

Next slide, please. This is a graphic image of the buses that are operating in California, as well as how many are on order. So on the bottom left there's 109 transit buses and some shuttle vans that are zero emission that are operating in California right now.

There's more than 240 -- or there are 241 that are currently with firm orders. It's just a matter of having them delivered. So we should have about 350 on the road in the next year or so. And so this graphically shows the different agencies, and the little stars, which is kind of hard to see here, a number of agencies and colleges have committed to full electrification.

UC Riverside will be all electric and one fuel cell bus by 2018. Antelope Valley Transit has 85 buses. They will be done by 2018 and Foothill Transit has committed to a transition by the 2030 time frame. And many others are stepping forward, including in disadvantaged communities in Central Valley.

Next slide. And I already touched on the

curriculum. I think the most important part of this one is the transit fleets have developed curriculum for training mechanics, drivers, maintenance personnel on how to maintain these types of vehicles. We think there will be synergies with heavy-duty, as well, and off-road.

Next slide, please. And the Advanced Clean Local Truck Regulation is our regulatory effort to require truck manufacturers to produce zero emission trucks. We kicked off that effort in November; had a workshop just recently this week.

Our focus is because the efficiency gains are higher, vehicle costs would tend to be lower. We do expect there to be centrally fuel fleets, primarily at the early markets. We're targeting local truck operation, lower risk in the early years.

And the market is -- a number of manufacturers are stepping into the market here and in Europe and other places. So we do see that putting requirements in place and providing a clear market signal is a key part of the strategy that is one of the reasons we do regulations. So we're on track to have it considered by our board next year.

Next slide, please. And this is just a little bit of background on what's happening.

Mitsubishi Fuso is a major truck manufacturer. They're bringing an all electric truck to market. They're bringing 100 to California this year. They expect it to be fully commercial by 2019.

Workhorse Group has an innovative strategy. They are bringing a range extended, battery electric pickup truck to market for the Class 2a category for commercial use. It effectively does 80 miles on battery power and then uses the light-duty BMW I-3 generator to extend range, or the IA generator to extend range.

UPS has been operating that exact platform in their package delivery trucks for at least a year for about 60 trucks. They seem to be pretty satisfied because they ordered at least 200 to 300 more already.

So we're seeing that the opportunities there are great, and when we've spoken to them they seem to be -- see that it has a quite favorable and roughly a two-to three-year payback without incentives for a truck like that.

So the potential for that market to grow rapidly is pretty large. And then there are a number of other manufacturers in the market. BYD, who manufactures buses is expanding into trucks. And so

we show the logos there of the number that are out there.

Next slide. And then lastly, we are also working directly with the airports on strategies to incorporate more zero emission vehicles and equipment for parking lot shuttles, rental car shuttles and also airport ground support equipment, as part of the strategy to off road, on road.

One of the things in working with these regulations, the questions do come up frequently of, hey, we want to be able to charge trucks and buses and cars all at the same place. It does present an interesting question in terms of how things are handled.

But there's a lot of interplay. One of the things that's evident in UPS trucks and some of the others, they do use level one light-duty chargers to charge their vehicles. So there's clear overlap. Heavier vehicles, of course, are generally going to use larger chargers.

Next slide. So this is really more for background for -- we have incentive programs in place that gives us the direct to the fleet purchaser where they can get a rebate on vehicles with different categories.

People who don't know about it should learn about if they're interested in looking at lowering their emissions and facilitating the process here of the transition.

Next slide. And then -- and this is just a little bit of background that funding that ARB has recently provided. I think that probably we'll cover it in other areas, but greenhouse gas reduction funds have been used to deploy more zero emission buses, trucks and other innovative vehicles that have the potential be either full electric or partial electric vehicles in multiple categories.

Drayage trucks are obviously an area of focus for many of the reasons you mention, on freeways and ports and all those obvious reasons, but also, innovative technologies that push the envelope as to what's already being done in the market to spur additional information. We will be collecting data on every one of those operational information. So that should help inform future decisions and information, as well.

Next. And then lastly, you know, heavy-duty electrification really does contribute to the same as light-duty. There is a bit of overlap, including in the infrastructure that is used to charge smaller

trucks up to Class 6.

And to kind of put that in context, if a car might use 400 gallons of fuel in a year, the same charger could be used to charge a UPS truck and that would displace 2,000 to 2500 gallons a year of gasoline.

So relatively speaking, it's worth considering for a bus or a drayage truck. We are focused on centralized, heavy-duty fleets, and those examples are using on the order of 10,000 gallons a year. So of course, the EVSC and other things would be more costly, but it's a pretty big fuel displacement associated with that and associated GHG emission reductions.

So hopefully, I conveyed that the heavy-duty market is started to -- economics are starting to improve. In buses, we see that it is cost-competitive in some applications, some uses. As costs come down, as manufacturers increase volume, we do expect that the economics will improve widely so that these will be self-sustaining markets that will not need incentives or other support over time.

And so ultimately, you know, we are trying to play our part and trying to coordinate a range of strategies. And support and melding elements in

terms of regulatory and Transportation Electrification policies ultimately need work together to provide that clear market signal so that manufacturers do make the investments and fleets take the time to learn and take some risks with new technology, as well. So thank you very much.

MS. RAITT: Thanks, Tony. So our next speaker is Naveen Berry, from the South Coast Air Quality Management District.

MR. BERRY: Tony's a little bit taller. Good afternoon. Naveen Berry. I'm the Technology Demonstration Manager with the South Coast Air Quality Management District, and I'll give you a brief overview of our programs and what drives us, which is basically the Air Quality Management Plan.

So the next slide, please. I'm not going to beat this to death, but basically, 44 percent of the state's population in our four-county region, and a lot of -- next slide, please -- and translates into this kind of a hazy muck.

And I actually took some photos from the airplane today and it was a beautiful inversion layer. I just wanted everybody to note that it was nice, brown haze. Next slide, please. This slide just basically depicts what happens between the

morning time and the afternoon.

And I'll just draw your attention to the purple chart, which is basically where most of our ozone non-attainment occurs -- and if you'd just push it one more time it should circulate -- and that's the area of our focus.

And most of the emissions don't occur necessarily in that area. They occur in and around the ports where it's nice and green most of the day, other than the localized emission issues, and EJ community issues. But really, when we focus on ozone it's really in the Inland Empire, and the Santa Clarita Valley.

Next slide, please. This chart just basically summarizes our emissions inventory. As you can see, the bulk of our NOx emission reductions needed are from the heavy-duty diesel trucks and off road equipment.

So a lot of my presentation is going to focus on that. Nonetheless, the South Coast Air Quality Management District continues to focus on battery electric and plug-in electric technology for light-duty vehicles, medium-duty trucks, such as UPS and shuttle buses, as well as many, many other areas.

Next slide, please. So basically, the previous

slide indicated that we need 43 emission reductions by 2023, and an additional 55 percent reduction in NOx, and the South Coast Air Quality Management District feels that a strong part of that has to come from full electrification or zero emission vehicles.

And towards that we did a three-year effort on our recently-adopted 2016 AQMP, and basically, for us to be able to achieve the 75 PPB 2008 level for ozone we need those cumulative emission reductions that I just spoke about.

This particular plan is a little bit different than what we had done in the past. It's very NOx dominant. I think the Chair hit it almost on the head. In the south coast 88 percent of our NOx emissions are from multiple sources, both on road and off road.

So that's a pretty significant area. Therefore, our Air Quality Management Plan is very much aligned with the Air Resources Board's mobile source strategy and sustainable freight plan, and many of the other areas that Tony just talked about. So I won't go into those details.

But really, where there's that 12 percent of NOx emission from stationary sources, South Coast is going to continue to put effort into those to, again,

do further electrification of small boilers and other combustion equipment that may create NOx emissions. So we're continuing to look at that aspect.

And then the other key change in this last AQMP relies on incentive, having the incentive monies be available. And I just listed a few, Prop 1b, Carl Moyer, and then of course, a lot of my work leverages funds from the California Air Resources Board, the CEC's AB 118 funds, as well as funds that we get from USEPA and Department of Energy.

Next slide, please. I'm not going to get into all of them, but the next three or four slides list out some key control measures that are mobile source related. And all of those will have elements of electrification.

So emission reductions at commercial marine ports will have hopefully -- and I'll get into some of those projects -- yard hustlers that are plug-in, or rubber tire gantry cranes or top haulers that are electric. So all of these areas and all the controlled measures have elements of Transportation Electrification built into them.

Next slide, please. And I'm just listing a whole slew where we I think covered every type of self-propelled vehicle out there. And when we say

accelerated penetration, we mean through incentive monies to turn those vehicles over.

And the AQMP focuses on a variety of different technologies. We've worked very closely with the California Energy Commission Staff on near zero engines, renewable fuel sources, and then of course, the battery electric and fuel cell technologies.

Next slide, please. This slide just summarizes some of the other kind of broader programs we look at where credit generation can occur or credit trading can occur, or, additional emission reductions that can be had through incentive programs before they become formal requirements are also part of our strategy.

Next slide, please. Now, I'm going to transition into what we've done to gain confidence that the Air Quality Management Plan that's been adopted is indeed going to be implemented and get us the emission reductions that we're seeking.

So about 20 years ago the Legislature created the Clean Fuels Fund and we use on average about $12½ million a year for research development, demonstration and deployment projects. And again, as I indicated, we leverage funds that are available

from our sister state agencies, as well as our federal agencies.

Next slide, please. So this slide just indicates a funding allocation that took place recently. Our Governing Board approved this in March, and I just want to point out that zero emission technologies or the fuel cell technologies, and the electric and hybrid technologies make up more than 50 percent of that funding allocation.

There's a lot of overlap there. We're looking at plug-in, fuel cell heavy-duty vehicles, as well. So I wanted to kind of make that point. And then we're going to continue to look at engine systems for both gaseous and liquid fuel near zero engines, because in certain sectors, interstate commerce, long-haul application, those are going to still continue to play a significant role.

Next slide, please. This kind of captures our overall program on what we think zero emission truck demonstrations will really achieve. And as I indicated, our goal is to engage large truck, original equipment manufacturers.

We think that's key to scalability in getting more and more of these vehicles out there with some greater level of shakedown testing before

they're implemented, and I'll share some of those with you in the next few slides.

Next slide, please. This is kind of a summary portfolio of truck projects, heavy-duty truck projects that we have. And as you can see, the bottom line is 64 of those. All of those have elements of Transportation Electrification.

Either they're direct battery electric only, and many of those are already in actual, realtime demonstration at dray service, at the ports. There's the plug-in hybrid electrics that have some type of auxiliary power unit.

It could be a fuel cell. It could be a alternative fuel, internal combustion engine or a diesel engine. One thing they all have in common is all-electric range. So those vehicles can go through some environmentally sensitive communities and operate on all electric range, and reduce those localized impacts that occur from, you know, standard or typical diesel exhaust.

Next slide, please. This is just one example of a DOE funded program that we have, where we have 18 trucks, again, a mix of battery electric, fuel cell electric and plug-in hybrid electrics. They all, for the most part, have plug-in capability.

So they have all electric range, and then the auxiliary power unit allows them to have a much greater range. And as you can see in the top, you know, we're estimating about 100 mile on the upper, and on the battery electrics, up to 200 on the fuel cell electrics and a little bit more than that for the plug-in hybrid electrics. So we're looking at a variety of different approaches to zero emissions.

Next slide, please. This particular project is not your traditional Transportation Electrification. This is a overhead catenary system. You know, nothing new. We've seen them in the U.S. and in Europe for more than 100 years.

Really, the novelty is to apply them to Class A trucks, where a pantograph comes up and at full speed they can connect onto the pantograph and operate in zero emission mode. We're hoping to get this project started in the very near future.

As you can see, we've had funding partners from a broad range of groups, including the ports. We're also working very closely with Southern California Edison on doing assessments as to how growth of this type of a traction system or a power supply need is going to be incorporated into their long-term planning efforts. So they are key partners

on that ancillary aspect, as well.

Next slide, please. This is what Tony touched on. The South Coast AQMD received a award from Air Resources Board on the California Climate Investments Fund for 43 battery electric or plug-in hybrid electric trucks with all electric range.

And as you can see, we've captured a large market share of the truck OEMs, and then BYD is expanding from buses to also providing trucks for this particular project. And this particular project was really unique, as well, because it not only is for the South Coast, but it's for the state.

Any air district, Bay Area, San Joaquin Valley, San Diego and -- are all partners of ours in this particular project, and these 43 trucks will be demonstrated on a statewide basis. So we're really excited about this particular project.

Next slide, please. This particular one, the South Coast was not the recipient, but I wanted to highlight it because we see momentum in this area at a very fast rate, which is yard hustlers. And this particular award is also from the Air Resources Board, the California Climate Investments.

And it was for 27 yard hustlers with some solar panels and medium-duty trucks, as well, and

those will be deployed the Inland Empire warehousing sector at daylight transportation, as well as at rail yards, and we're excited about this particular project going.

And really, the idea is to monitor what issues and hurdles they come up with, not just performance on the trucks themselves, but also what other ancillary issues needs to be considered. How do demand charges play a role? How do we work with the utilities in trying to address some of those issues?

Next slide, please. This particular slide just shows what the South Coast has done in terms of medium and heavy-duty infrastructure projects. And right now, we are working closely with Edison on their application to the CPUC for additional medium and heavy-duty Transportation Electrification projects that they're interested in.

We've supported their position with formal proceeding comments and so on, and we're continuing to work with them in incorporating their efforts and their infrastructure goals into our research, development and demonstration projects, as well, and I think that there's real potential for synergy there.

As far as publicly-owned utilities go in the South Coast, we've had a very long-term, established relationship on light-duty and heavy-duty infrastructure with the L.A. Department of Water and Power, and I think you'll hear a lot more from them. So I'll let Marvin cover a lot of that.

But we continue to support each other's programs and they're also becoming increasingly part of our medium and heavy-duty RD&D programs. So really the goal that the South Coast has is to work with all the different entities.

And I think meetings like this, these are fantastic because it gives us an opportunity to talk about how there's some still need for standard development for medium and heavy-duty electrification, and how common charging, the plug, the receptacle are going to be really beneficial areas to all collectively work on, and then also look at other ancillary charges -- I mean, ancillary issues like demand charges that I talked about.

Last slide, please. So again, in conclusion, our driving focus is really the NOx reductions or the criteria pollutant reductions, but we continue to focus and work closely on reducing the criteria pollutant along with greenhouse gases and

the use of fossil fuels, as well.

So we work very closely with the Energy Commission, and I actually wanted to thank the Energy Commission for being such great partners of ours. And really, the idea is a hyper focus on NOx reductions from medium and heavy-duty electrification or medium, heavy-duty platforms, and I really think Transportation Electrification is a big part of that. So with that, thank you.

MS. RAITT: Great. Thank you. So next we have a slight change to the Agenda. We have Chay Thao, from the San Joaquin Valley Air Pollution Control District, instead of Samir Sheikh. You can -- if you want to control your slides you can come here. Okay. Great. Let me just do that. Thanks.

MR. THAO: So I'll just sit here. Okay. Great. Great. All right. Good afternoon. My name -- again, my name is Chay Thao. I'm a Program Manager at the San Joaquin Valley Air Pollution Control District.

And so and the Valley's attainment challenges are really unmatched by any other region's, our geography, and as far as the meteorology and everything's really going against us. So we've done a lot over the years to get reductions

in emissions.

You know, we've adopted numerous attainment plans. You know, we have some of the toughest air regulations in the nation, have adopted over 600 stringent rules and regulations, and service ground -- some groundbreaking rules serve as models for others.

And we have over 80 percent reduction in stationary source emissions so far. Spent $40 billion, spent by businesses just on clean air technology. And we also have a strong incentive program. Spent about 1.6 billion in public and private investments in reducing about 130,000 tons of emissions.

And we also have a Public Education and Participation Program to build support for tough measures that we adopt, for example, like the residential wood burning, you know, to urge air friendly behavior by the public.

And through these combined efforts the valley and the San Joaquin Valley's air quality has been better than any other time on record. But despite that, you know, there's still a lot of significant challenges coming up. We're currently preparing our attainment strategy to address mobile

PM 2.5 standards under the Federal Clean Air Act.

And so we -- between now and fall of 2017 we have three standards to address, the '97, the 2006 and the 2012 standards. And so in addition to that, the -- as many of you may already know, there's a recent 2015 ozone standard dropping from 75 to 70 parts per billion.

So that's going to be upcoming also, and that NOx is going to be a critical strategy because it's a precursor to addressing both the PM 2.5 and also, the ozone standards. And meeting the new air quality standards are -- it's going to require just an enormous amount of reductions in emissions, particularly from mobile source emissions and in a short time frame.

So just as an example, for the 2006 standard the attainment date is 2019. So that's just right around the corner. And as we approach this, you know, we're still going to do our own part in leaving no stone unturned in getting all the necessary emission reductions that we can find from sources that are under our jurisdiction.

And a failure to address such mandates would subject the Valley to devastating federal economic sanctions. And so the main point here is we're going

to need a massive amount of additional mobile source emission reductions to reach attainment.

Over the years we've implemented so many stringent rules for stationary sources and have put a lot of effort and investment into there, including incentives, that a lot of the stationary sources have been, like I mentioned earlier, dropped, reduced by about 80 percent.

So now, the main source of emissions for us in the valley is mobile sources. It makes up about 85 percent of the remaining NOx emissions in the Valley for us, and these are primarily under the state and federal jurisdiction.

And so advancing the development and deployment of zero and near zero emission technologies is going to be critical for us to this attainment strategy, and especially when we're looking at Transportation Electrification. So this is very important for us.

From a near-term perspective we see that there are certain categories we can pursue which are to demonstrate -- there has been demonstrated a feasibility for the light-duty and the small off road categories.

And we're looking at, like, light-duty, like

passenger vehicles, and even limited heavy-duty, such as regional delivery or refuse or garbage trucks or urban transit, where the distance is -- where the range is not as long. And in the long-term, though, we're really hoping to be able to do something with heavy-duty electric vehicles for the long haul in rural transit.

But at this point it's -- the technology we have not -- the technology isn't fully there for the heavy-duty and also especially for the long-haul. And there's -- we do have programs such as the Technology Advancement Program, which I'll talk a little bit further here to demonstrate kind of a hybrid between the electric and with an ancillary power, whether that's natural gas or -- okay.

Here, so as far as what we're doing, we're really at this point grabbing whatever we can and getting whatever reductions that we can at this point. And so for -- in terms of electrification, you know, we have our Technology Advancement Program, which is designed to accelerate the development and deployment of zero and near-zero technologies.

And so this is basically just, we provide the necessary funding to demonstrate different types of projects, for example, like the electric yard

tractor that we helped fund at the IDEA Distribution Center, that one's just pure electric.

And we still have other projects in line that are using mix of hybrid technology electric along with natural gas. And we also have a charge-up program to purchase and install electric vehicle chargers for public use, and of course, a drive clean, which is for rebates and incentives for electric passenger vehicles.

And we also are involved in Enhanced Fleet Modernization Program, also known as EFMP and also the EFMP Plus, to provide funding for more fuel efficient vehicles and including the electric vehicles.

And of course, we have multiple fundings for, for example, a commercial scale charging infrastructure for electric school buses, electric transit buses, electric or hybrid trucks. And we've also developed a plug-in electric vehicle readiness planning to help local governments in identifying and finding ways to remove barriers to electric vehicle usage.

And so transformative changes, which is electric vehicles, going to electric vehicles to transportation is going to require a sustained policy

and funding support. I think at this point we still need to promote, find some ways to promote and provide support for development, demonstration and deployment of the electric vehicles in various applications.

And most importantly, we need to provide the necessary infrastructure to support growth in electric vehicle usage. For example, we need to show that there's sufficient capacity to handle the electric -- this increase demand, both at the, like, passenger, and also to commercial usage.

And we also need to find some way to extend access to electricity in key areas to provide sufficient charging coverage to enable the use of electric vehicles, and also need to provide cost -- find ways to provide cost-effective electric rates for users.

And that pretty much concludes my presentation, and if anybody has any questions we'd be happy to answer -- I'd be happy to answer them.

MS. RAITT: Thank you very much. Next is Noel Crisostomo, from the Energy Commission.

MR. CRISOSTOMO: Thanks. I'll be going through my slides rather quickly to make up some time, and since these were presented last week at the

Light-Duty Workshop. So to outline what we're going to talk about today, I'll provide the policy background for our electrification efforts as a state, and our objective as the Energy Commission for Transportation Electrification Planning as part of the IRP.

I'll go into detail about recommended data, information and reports that are included in our IRP Guidelines that were presented -- or that were published in advance of the Workshop on the 18th, and with some thematic questions which we'll be going over during today's discussions with the POUs.

So Governor Brown's Executive Order from 2012 ordered the Energy Commission and the other agencies to establish benchmarks for a transformation towards zero emission vehicles for the state. The CEC is helping the state achieve by 2020 a number of goals, including supporting infrastructure for a million ZEVs, which do include transit and freight ZEVs that we are talking about in detail today.

In addition, the CEC is setting benchmarks for increasing access to these vehicles as more cost-effective solutions, and working toward reduced greenhouse gas emissions on the order of 80 percent by 2050.

In addition, just a new part for today's discussion, we're of course supplementing the 2012 Executive Order by a more recent Executive Order for the Sustainable Freight Action Plan, which intends to improve the efficiency of the freight system represented by a 25 percent improvement in the value of goods and services per CO_2 emitted, to deploy 100,000 vehicles and equipment by 2030 in the freight sector, and third, to improve the future competitiveness and economic growth in the state.

SB 350 requires the POUs to consider Transportation Electrification as part of their Integrated Resource Plans. Specifically, POUs are responsible for addressing procurement of Transportation Electrification and meeting the goals of the Public Utilities Code, which include providing customers service for this new electricity, reducing impacts to ratepayers, improving the reliability of the electric grid, improving diversity and sustainability of the grid system in our communities, enhancing demand side management programs, and of course, minimizing greenhouse gas emissions and air pollution emissions in our disadvantaged communities.

To this point, CEC may adopt guidelines to govern information and data reporting to the -- for

the CEC's review, as part of the Integrated Resource Plan process. We believe that the POUs are going to -- are able to provide indispensable contributions to Transportation Electrification efforts in California through their Integrated Resource Plans.

Therefore, the Staff Proposal recommends that the following data, information and reports that we'll be going over in the next slide serve as the best practice benchmark for the POUs in order to support the growth of charging infrastructure that's needed and to support integrated electric grid operations to enable widespread Transportation Electrification and emissions reductions.

So with this framework that adds upon the Executive Orders SB 350 and the Draft Staff Paper for Integrated Resource Plan Topics that were released in February, the next slides cover data that we would like to recommend that the POUs consider in their IRPs.

The first area regards -- sorry. Before we get into that, Staff recognizes that gathering the information requested will take additional time and resources, and so we recognize that the POUs might not have all the information at this point, but we look forward to working with them in order to enhance

their capabilities, since they are all different.

All of them have different local priorities and governing boards, resources and technological focuses. So the guidelines here are intended to account for the need for flexibility across the POUs throughout the state.

Toward this point, their Electrification analyses, program preparations and eventual accommodation of customer loads will have to be an ongoing process as we learn about new technologies that are being developed, and new use cases that can be served by electric vehicle technology.

And therefore, we anticipate that this IRP process will be an evolving and ongoing process. So we welcome your support and feedback on how the POUs and the CEC can work together toward widespread Transportation Electrification.

And so while I'll be going over the Staff Proposal on a high level, I'll refer you to the link in the presentation. The first area of Recommended Guidelines were to quantify, characterize and locate EV charging load.

This includes accounting for the number and types of Transportation Electrification vehicles, charging infrastructure and the customers that use

TE, the need to also account for the additional load brought onto the grid, fuel switched from petroleum to electricity and the resulting tariffs that they are able to use provided by the POU.

And a third area to quantify this TE load is methodology to account for the air emissions reductions, both in greenhouse gases and air pollutants. One recommendation specifically was to align with the ARB inventory, which is graphically characterized here by economic sector and activity.

You can see that heavy-duty vehicles are I believe roughly 10 percent of the 40 percent of overall greenhouse gas emissions in the state. I believe that's on the next slide, sorry; eight percent heavy vehicles. But the recommendation would be to align to ARB reporting conventions for fungibility in the data.

The second area of programs that we would like to account for how the utilities are designing investments incentives, tariffs and rates or generally, programs to encourage this new TE load. We'd also like the POUs to specify the specific market barriers and the proposed solutions to overcome any customer hesitancy or technological barriers to use EV technology.

And we'd also like them to specify how they are prioritizing disadvantaged communities that are disproportionately affected by air pollution as notated here from an excerpt from the CalEnviroScreen map.

A third area of information that the POUs could provide to the Energy Commission include how they are prioritizing their TE programs in leveraging external sources of funding. These are essential to align the POU efforts to the specific emissions inventories that we just heard about, not only from the non-attainment areas of San Joaquin and South Coast, but all air basins throughout the state.

So we'd like the POUs to design their programs to account for the specific emissions reductions needed. We'd also like the POUs to align with existing state incentives so that they can leverage those funds, including the Alternative and Renewable Fuel Vehicle Technology Program or the Air Quality Improvement Program, et cetera.

And overall, leveraging these funds and supplementing those funds from private, local or federal sources are necessary to reduce the impacts on the POU ratepayers.

The fourth area is to learn how the POUs are

educating and outreaching to their customers.

So the IRP Guidelines request to learn and qualitatively note how POUs are engaging with their customers on these programs, and specifically, we'd like to focus their attention on how they would coordinate with facilities that account for large amounts of the mobile source inventory in their service territory.

The map shown here is a screen cap of ARB's Integrated Emissions Visualization Tool, which notes stationary sources, but one could imagine distribution centers or certain parking lots to be serving a large number of fleet vehicles, which could be a important point in their system to target both from emissions planning standpoint and reduce impact in the community, but also, a grid impact and load impact valuation standpoint.

The fifth area in the Guidelines are aligning the TE strategy with state policy and local needs. In the Guidelines we list a few of the state strategies, including the ZEV Action Plan Mobile Source Strategy, Sustainable Freight Plan and Vehicle Grid Integration Roadmap.

But of course, there are many other state initiatives that the POUs could be leveraging. We'd

like to understand how they're doing that. In addition, exemplified by this excerpt from a CEC map of the POU electrical service areas, it is also important -- we also think that it is important to coordinate across utility territories to meet regional infrastructure needs, especially since these mobile sources may be traveling across multiple POU areas.This is important to insure inter-operation of our charging infrastructure and enable accessibility for these inter-territory vehicles.

The last area is a need to coordinate TE programs with distributed energy resource planning.And so the Guidelines recommend that the POUs describe their TE programs as part of an overall DER planning effort to insure that our new charging loads from EV fueling are consistent with the electrical grid conditions that are rapidly changing.

This is a graph from the ISO's OASIS renewables watch, which -- from last week -- which shows that generally we could potentially add charging during the day to help absorb wind and solar, reducing the ramp during the afternoon, and potentially use TE programs that could dispatch demand response to reduce how high the duck might raise its head during the day.

And so I'll conclude with some questions to prime the POU discussion. We'd like to learn what about the benchmarks and guidance are helpful or unhelpful in planning for Transportation Electrification.

We'd also like to learn how can they be used to inform the changing grid operations. Can the benchmark and guidance be more effectively designed to communicate the POU contributions to meeting state goals, but also the needs for assistance from the state in whatever way that they need?

Would the benchmarks and guidance be better enhanced by referencing others' reporting or modeling conventions? Can they be made consistent across the utilities to enable head to head comparisons where such cross-utility comparisons are appropriate?

Finally, how could the benchmarks and guidance be treated carefully, given the rapidly changing technologies and new available vehicles in this space, and how can the demand forecast and plans be flexible to account for that change?

So more discussions will follow during our afternoon panel with the POUs, but we would welcome questions, comments and feedback afterward, and look forward to your written comments, as well. Thank

you.

MS. RAITT: Thank you, Noel. Thanks. Shifting to the large utility perspective is Eric Seilo, from Southern California Edison.

COMMISSIONER SCOTT: Heather, right before you shift to that, let me just make a note on the -- our kind of our scene setting, which I think was excellent. I just want to say thank you so much to the Air Resources Board, South Coast Air Quality Management District and San Joaquin Valley Air Pollution Control District for really helping set the stage so we can understand kind of the circumstances that are driving the need for electrification, and then it really helps us to put in perspective why we're focused on medium-duty and heavy-duty.

Both of you -- all three of you in your presentations kind of helped hone in on why we're focused on the medium-duty, heavy-duty. So I really appreciate that. I wanted to echo back a remark that you had made about appreciating partnership with the Energy Commission.

We very much appreciate the partnership with you on this, as well, as we think about how to leverage our information and our strategies and our dollars to really accelerate where we need to be.

And that's probably it. I just wanted to make that remark.

MS. RAITT: Do you have anything on the first panel?

COMMISSIONER SCOTT: Okay.

MR. SEILO: So thanks for having us out here. I can sort of talk about this type of stuff all day. So I'll try to keep my comments short. But I'm Eric Seilo. I'm from Southern California Edison. I worked helping design the Charge Ready Program back in 2014, and then was also the Lead Project Manager on our January Application.

And so, if you don't know, in January along with the other IOUs, Southern California Edison filed an application for a portfolio of investments and programs in order to help accelerate Transportation Electrification adoption.

This portfolio really focused less on the light-duty segment, which the charge-ready Pilot was taken care of and then eventual phases will focus on light-duty, and the big chunk of it was really focused on medium and heavy-duty applications.

So I'm going to talk a little bit about our motivations behind that application. What we actually proposed, in case you guys haven't had time

to read the application or the 100 or so pages of testimony, and then sort of give some insight into how we got to those numbers and some challenges that we faced that you might face in developing programs of your own.

So you're going to hear me say this multiple times, but the medium and heavy-duty sector is not like the light-duty sector. It's much more complex and it's much more diverse. And that really shows itself initially when we talk about emissions.

So as Chair Weisenmiller mentioned, you know, 50 percent of the GHG emissions in the state, when you include refineries, are coming from the transportation sector. The majority of that is from the light-duty segment, simply because of the number of vehicles out on the road and the miles being driven.

The opposite is true when you look at NOx emissions, where 80 percent of the NOx emissions come from the transportation sector, half of which are from the medium and heavy-duty and non-road segments. Now, this is important for Southern California Edison because we serve the San Joaquin Air Quality Management District and the South Coast Air Quality Management Districts, which are the only two air

basins in the nation that are in extreme non-attainment for ozone.

And there was a recent L.A. Times article that says Los Angeles County has the worst air quality in the entire nation. And so this directly impacts the area that we serve and we're acutely aware of those issues.

And so you can't address those air quality issues without addressing the medium and heavy-duty segments, and specifically, those segments where the reductions that you're getting per kilowatt hour of load added from those segments, you'll get about 30 to 80 times more per kilowatt hour than you will with cleaning up the grid through energy efficiency or renewables.

And so if you really want to attack this problem you have to focus on those transportation segments. So like I said, that we serve South Coast and San Joaquin, we also have about half of the state's disadvantaged communities.

And this really stems from the fact that we have the Port of Long Beach and the Port of L.A. in Southern California. SCE serves the Port of Long Beach itself. It doesn't serve electricity to the Port of L.A.; however, the goods coming into L.A.

ride on trucks that go through our service territory.

And so as you can see on this chart, the yellow highways are the freight corridors, and they kind of disperse all throughout Southern California and you can see, and it's kind of no surprise, all of the pink areas along those freight corridors are where the disadvantaged communities are located because of those NOx and particulate matter emissions.

And so this is something that we're hyper focused on at SCE, solving this issue and doing that through Transportation Electrification. We think that we can really serve a role in overcoming these barriers and address some of the problems that we've been talking about.

However, we are aware that we don't sell vehicles and we don't want to sell vehicles, but we do play several distinct roles that we have identified. And that's really increasing availability of infrastructure, increasing affordability of our fuel and then also increasing awareness of the benefits of Transportation Electrification.

And we do that, obviously, through being able to provide infrastructure, whether it's an

obligation to serve or it's beyond the meter investments like we've proposed in charge ready and this newest application.

Or it's rate design in order to help combat some of the barriers that we've heard, especially from the medium-duty and heavy-duty segments related to demand charges, and then also, increasing awareness, and then also, availability and affordability through innovative collaborations.

And so because we serve the Port of Long Beach, collaborating closely with them on how they can electrify, what they can electrify, what their charging needs are, the rates that they can use, that's very valuable.

And then we're also very proud to say that we have several transit agencies within our service territory that have made commitments to increase their electric vehicle adoption and even go 100 percent electric by specific dates.

And so we really see Edison as sort of the clean energy adviser to these new customers. So with this in mind, on the areas that we see or the roles that we see SCE playing, I'll talk a little bit about what we actually proposed in our application.

So again, I said it was a portfolio, and we

had several items in the light-duty segment. I will not describe those right now. Instead, I'll focus on what we did to address the medium and heavy-duty segments, some specific issues for transits, two projects at the ports and then a very innovative or what I think is very innovative rate design option for these vehicle segments.

So on the large $553 million medium and heavy-duty project, we took the model of charge ready and we expanded it to essentially all non-light-duty vehicles, and this includes non-road vehicles, as well.

And we were planning to provide or were proposing to provide infrastructure from a new service drop to all of the trenching, paneling, conduit and civil work on the customer site in order to service charging stations, as well as provide a rebate to the charging station for these customers, as well.

One of the major barriers that we identified was an up-front cost for these vehicles. And when you're talking about putting in charging stations for light-duty vehicles, the cost is -- are fractions of what you have for these medium and heavy-duty vehicles, because charging can be nearly 70 times --

75 times faster or more intense than what we see in the light-duty segment.

And so the increased infrastructure and costs associated with that are tremendous for these areas. In the bus area we had the opportunity to propose a Priority Review Project because several, as I mentioned, several of the transits are further along than other vehicle segments.

We wanted to reward those fast movers and sort of get out of the gate and get some learnings in a faster approval time line for these transit agencies. But essentially, the model is exactly the same, providing infrastructure up to a stub and then a rebate on a charging station for these vehicles.

At the Port of Long Beach these were two very specific projects, one focused on electrifying rubber tire gantry cranes at one of the ports, nine of them, and then another one focused on electrifying non-road ER tractors, so heavy duty trucks that move containers within a one port complex, and again, providing that infrastructure up to a stub for these customers.

So you can see a theme here on the infrastructure side and that being a big barrier that we think that we can address. On the affordability

side, we heard a lot talking to customers, specifically in the transit agencies, but also in some other medium-duty and heavy-duty customers about rates and about demand charges, and the challenges around not only the complexity of understanding what that is and the impacts on their charging and when they can charge and what they should be installing, but also the cost.

And so in this proposal we have -- it's a 10-year introductory rate where the first five years, demand charges are waived. We recoup some of that revenue through an increased energy charge, but it's very simple for the customer to understand.

And when they're in the early stages of adopting these vehicles, when they have one vehicle or two vehicles or three vehicles, they don't have to worry about demand charges being spread across a small amount of kilowatt hours.

For years six through 10 we gradually ease those demand charges back in so that as they increase their fleet those demand charges can be spread across more kilowatt hours and the actual cost per mile or cents per mile for them is less impacted.

And then from years 11 on, the demand charges are -- the structure is the same as it is

now. However, after reassessing some of these load shapes the demand charges are less than -- modeled less than what they would be right now.

And so we think that this is a very unique way and we really pushed our rates team to go, nope, go back to the drawing board, make this better, figure out a different way to solve this. And we think that this is a great proposal and we've gotten some really fantastic feedback from transit agencies and from -- some from heavy-duty operators.

So in a nutshell that's what we're looking at. And I'll talk a little bit about sort of the goals and what we expect to satisfy there. So initially, or first off, the goals outlined in the Guidance by the signed Commissioner Ruling and the PUC, we wish to satisfy all of those, obviously.

But we also with this hope to deploy, and specifically speaking about the medium and heavy-duty program, deploy in a wide range of market segments. So when I said the medium and heavy-duty sector is not like the light-duty sector, we have several different types of customers that operate several different types of vehicles, and the weight classes and the technologies are all in different stages.

And so we wanted to make a program that was

very simple for customers to understand. So we said, if you have an electric technology that is a non-passenger vehicle, non-light-duty vehicle, we will be able to service that infrastructure.

So this includes forklifts, medium-duty trucks of different weights, heavy-duty trucks, other non-road infrastructure like yard tractors or cranes, et cetera, but the program structure is the same. And so being able to provide this for both nascent and mature technologies really sends a signal to the market that it's okay to be moving in this direction of electrification.

In this five-year program we are really not going to solve the GHG nor the air quality issues in our territory. So SCE really views this as the first in many future programs that obviously will be adapted as we go along to overcome appropriate barriers.

But this is really just the start when we're talking about scale and the issues of the problem as we have addressed earlier. And so I think one of the keys of this program is that it's a five-year program. When we proposed charge ready we split it up into a pilot program and then a phase two program that was an additional four years.

We think in this market segment because several of these areas are nascent and because lead times to purchase these vehicles and make the purchasing decisions are a lot longer for these customers, having a five-year program that really enhances that confidence and that stability and allows customers to say, okay, I can begin thinking -- I heard about this program; I can begin thinking about it; I know it's going to take me two years to purchase a vehicle. SCE will still be there to provide this infrastructure for me when I'm ready to need it.

And so we think that that's a very key area, to provide that market stability. And then also, we're going to be able to collect very valuable data to enhance the future of this program and additional programs.

We think that this -- SCE's role and the scale will chance as this program moves on and with future programs. And then obviously, one of the main goals is really to minimize that cost barrier and support not only standardization and help drive the market toward standardization, but also innovation, and then the traditional roles of minimizing grid impacts.

And this really falls into that awareness bucket where SCE can work with customers over a long period of time and advise them that super fast charging may not be necessary for them. They can do depot charging and it will cost them less, and what is the rate impact and really being partners, partners with these customers.

So some of the challenges that we had in this area I think really stemmed around this vehicle population and how big do we make this program. What is an accurate forecast? There aren't a lot out there for medium and heavy-duty space.

I think that this is up internally for each of the POUs to decide what they're looking at. I won't -- this is actually, I realized after I put this together, a little complex to talk about on each one of these charts.

It's just a lot of layers, but I think the take away from this is that we relied heavily on the ICF and E2 Transportation Electrification Assessment for our vehicle population numbers in a forecast to scale our program to.

But when I said that there was a lot more complexity in these vehicle segments, for example, what does medium-duty mean by weight class. Is that

one weight class? Is that three weight classes? Heavy-duty trucks can have 17 different weight classes.

What do you want to plus? When you're doing vehicle -- and each one of those can have a different forecast and impact the scalability of a program. And so something to keep an eye out whether you're using EMFAC or you're using EPA or using something like the T Studies to really identify what vehicles are they talking about, because an F350 electrification is very different than a UPS small delivery truck, even though they may be in the same weight class. So something to keep your eye out.

That really leads into, once you have this forecast of vehicles, is to go okay, well, how much is all of this going to cost. And so the way SCE approached this was, again, to identify those market segments and the technologies, leaning on the T Study and then really defining the charging use cases.

So again, this is not light-duty and it's very different and complex. We created different use cases for all of the different vehicle segments. So those use cases were based upon, initially, charger size. So a 10 kW charger, a 26 kW charger, 52 and 200. And all of this is dealing in generalities.

Deployments will be different everywhere you go, but you need to have some type of basis to make these projections. So once you have those charger sizes, then you have the scale of the site, anywhere from two to 50 chargers, and then you have some different complexities.

For example, a cold storage warehouse is going to be different, very different than an asphalt depot yard with regards to cost and infrastructure-related. And so you multiply these together and you have about 60 different scenarios per vehicle class.

And so from each of those scenarios you can identify what you think is going to be -- what we thought -- we identified what we thought was going to be most appropriate, and we decided to choose a slow-charging option and a fast-charging option for each type of vehicle, medium-duty, heavy-duty, forklift, et cetera.

And we identified the costs of each of those scenarios on the utility side, separated by the traditional location of the meter, of which we did some internal forecasting, and then the customer side where we contracted with an A&E firm who was working on the charge ready deployment who are experts on those site costs to establish those, the cost of each

scenario, and then got site costs for each one of the vehicle classes, and then just applied those to the forecast.

We leveraged some work through -- heavily through EPRI that the other IOUs also used, as well, which is publicly available and cited in our testimony, to help us with the allocation of fast charging versus slow charging per vehicle type, the cost of charging stations, the charging speed, et cetera. So I think that there's some good information to reference going forward.

And then I think I'm going to -- I think I will kind of just briefly touch on what we did, looking at our Emissions Reduction Analysis. We did not do any specific emissions reductions for NOx within our territory, but we did take a look at the GHG reductions because of guidance through the ACR.

And it's a little bit challenging, because it's definitely based upon your adoption forecasts and based upon your internal modeling. And so if you're adding 7,000 gigawatt hours of load by 2030 you're production profile and the emissions from the grid are going to be very different than are just currently today.

And so we dropped all of our forecasted load

out to 2030, assuming that this program is approved, and we achieve adoption in line to achieve the GHG goals, and we were seeing increased emissions in the electricity sector, as expected, because we have increased electrification, but more decreases in the electricity sector. And so net we're seeing more reductions than some of the scenarios in ARB.

So just very high level on what that is. I'm happy to take, you know, more questions. Obviously, there's double clicks and triple clicks under all of this, and it's a good summary.

CHAIRMAN WEISENMILLER: So if you were to -- this is Bob Weisenmiller. If you were to achieve --

MR. SEILO: Hi, Bob.

CHAIRMAN WEISENMILLER: -- your goals here what would be the percentage reduction in NOx emissions in the basin?

MR. SEILO: I don't know off the top of my head. I'd have to go back and --

CHAIRMAN WEISENMILLER: Okay. That's fine. If we could it --

MR. SEILO: -- check those -- yeah, I don't have them --

CHAIRMAN WEISENMILLER: -- that would be interesting, yeah.

MS. RAITT: Thank you. Okay. So now, we'll move on to the first panel on POU Responses to Draft Transportation Electrification Guidance for POUs. And Noel will be the Moderator and we'll -- if folks could come up to the table we'll get that ready.

(Pause)

MR. CRISOSTOMO: So thank you, everyone, for joining me on this panel for the Publicly Owned Utilities' thoughts on our Transportation Electrification Guidance. I'll introduce the panelists and describe their first round of roughly 10-minute presentations, and lead in eventually to a discussion on some of the themes of the day that I introduced earlier.

To my right, first, I have Barry Moline, from the California Municipal Utilities Association, Lowell Watros, from Redding Electric Utility, Bill Westerfield, from Sacramento Municipal Utility District, and Marvin Moon, from Los Angeles Department of Water and Power.

So Barry, start us off, please.

MR. MOLINE: Okay. Thank you, Noel. Chair Weisenmiller and Commissioner Scott, I'm Barry Moline, with the California Municipal Utilities Association. It's a pleasure to be here and to have

this conversation with you.

I want you to know that publicly-owned utilities' community strongly supports the widespread growth of Transportation Electrification, and this transformation is essential for California to meeting its long-term greenhouse gas reduction goals.

The change also represents a new opportunity for electric utilities to expand into the services that we offer our community. So we're beginning to recognize both the value of this opportunity for our communities, and we've known for a while the value of the broader opportunity for society.

Now, as we talked about in the April 18th Workshop, many POUs have already developed innovative for charging infrastructure, and including incentives, rate structures, all those things to encourage Transportation Electrification.

And many POUs are in the process right now of developing their programs. We have a few that have gone down the road, so to speak, already, but everyone's paying attention and eager to learn from each other.

Now, because POUs generally have smaller, more uniform service territories, they need to design their programs that fit their local communities, and

this is particularly true for Transportation Electrification, because there's factors such as particular local economic conditions, rural versus urban issues, existing transportation infrastructure, our customer makeup that may be very specific to a region.

All those things influence the kind of programs and incentives that we see offering our communities. So the need for a focus on programs that are targeted to medium and heavy-duty electric vehicles needs to be driven by these factors.

So for example, there are some POUs that have customer load that's almost all commercial and industrial, while others, such as Imperial Irrigation District, have load that is at least half residential. So the customer makeup and the programs will differ based on their priorities for investments.

So while these programs are necessary -- well, are effectively different across the state, we like to collaborate and share best practices and learn what we can from each other in developing each of our programs.

So regarding information gathering, we recognize a need for greater amounts of information

on Transportation Electrification and even though this information exercise is important, we think that the Commission should not only be using the information for recommendations for POUs, but also, it's an opportunity for the Commission to address its own electrification programs.

So we think that the IRPs are a good checkpoint for the Commission and the POUs to determine what's working well and what needs to be improved. And our goal is to collaborate with the Commission to achieve the state's Transportation Electrification goals, and we've had conversations with Staff and we're more than hopeful.

We believe that there's a strong opportunity on both sides to work together to achieve those goals. We also think that we need to limit the burdens that may be in law today or regulation, and we plan to file joint comments with the Northern California Power Agency and the Southern California Public Power Agency that'll provide recommendations to the Commission Staff on the Transportation Electrification Guidance document.

One key concern is that there's a significant opportunity surrounding the future of EV growth and how the market will develop. We currently

have a relatively small load associated with electric vehicles, and because of this, many POUs have not done the type of analysis that would be necessary to provide the annual estimates to 2030 for all the categories contemplated in the Guidance document by the deadlines for submitting the initial IRP.

So what we mean is that we just don't know what growth is going to look like, based on historical evidence. Instead, we see opportunities for the automakers and dealerships to provide estimates on future EV sales.

We think that they're better situated for that, and for future IRPs that are done by POUs we may be able to provide -- or POUs may be able to provide this data if there's a better collaboration between local dealerships and automakers.

Also, we think that the CEC can work with the DMV to get better access to existing electric vehicle sales and information. So similarly, POUs have not really incorporated electric vehicle load forecasting into their resource planning processes, and mostly because the load is to small.

So this will likely change for future IRPs when these loads increase and the forecast becomes more sophisticated. So ultimately, we see

opportunities to work together.

We also see an opportunity to work with the ARB, and that is the POUs continue to urge the Commission to work with the ARB to develop a methodology for estimating the amount of EV load that a utility has without unrealistic and specific metering.

We also think that the Commission could allow or could collaborate with ARB to insure that there's no regulatory disincentives to POUs supporting Transportation Electrification. So with that, I'll conclude my remarks and look forward to working closely with you. Thank you.

MR. WATROS: Lowell Watros, Redding Electric Utility. And I was listening to the presentations beforehand, and I've lived in Southern California. I appreciate what they're dealing with and so I'm sort of like, you know, almost on another planet up in Northern California.

Our load is less than one percent of the state. We're the smallest utility I believe that's under the IRP process. But even having said that, I think we have some positive things to contribute, and if you don't get a statewide buy-in on the EV Programs you're going to have some problems that are

larger than the remote areas.

And so what we've -- we have not done much on the heavy and medium and heavy-duty vehicles. We have looked at, just recently last week, we were looking at a EV bus to go into our local public bus fleet, and we might fund some of that.

So that's our kind of toe in the water. But on the light-duty vehicle we got approval last week for an EV Program, and that's funded at $1.7 million. And so we're stepping out. For our size of community that's a pretty sizable commitment to an EV Program.

And some points within that, education, community outreach, media, so forth, incentives, direct incentives for vehicle purchases, incentives for level two chargers, both residential and commercial.

Level three chargers, a few within our service territory for the range anxiety issues, because we are a little bit remote there. And we're also -- we've started a pretty extensive analysis of our city fleet vehicles.

And so we're looking to do some replacement there, direct purchasing using some of those funds. The EV Program that was approved last week was party of a larger greenhouse gas reduction funds program of

about 6.5 million.

So that's a quick overview of what we're doing, and with this I think we will see a cultural change and that's what we're hoping for, you know, I think California-wide. And we have a kind of a hurdle in the more rural area compared to, as the presentation showed earlier today. So with that, that's about what we have in Redding.

MR. WESTERFIELD: Great. Noel, we brought a few slides, so thank you. Just a few. Thank you. Good afternoon, Chairman Weisenmiller and Commissioner Scott. Thanks for having us. Actually, I am pinch-hitting for SMUD's real expect on electric transportation today, who of course if Bill Boyce.

He is down in the Bay Area and can't be with us, so I will do what I can to answer your questions, and the tougher ones we may have to put off for another day. I will mention that if Redding feels like they're on another planet, we probably feel like we're on the moon in comparison to SCE.

We're not nearly their size and we certainly don't have their resources to analyze heavy-duty -- medium, heavy-duty truck cases like they do. So we will look forward to working with them and others to help us out on that.

Next slide. Right. We thought it would be useful to focus on what SMUD is doing to plan for EV vote in the medium and heavy-duty sector, sort of where we are currently in 2017. That's how I plan to use the bulk of my time.

I think there's some IRP related questions. We might have to save those for Q&A. SMUD medium and heavy-duty electric vehicle market, we have just completed an assessment study by Black and Veatch. That's a big step for us.

They've just turned over the results of that study, I think within the last month, and we're in the process of going through it. I'll be able to share some results but -- in a moment, but there's a lot of digesting of that information that we need to do before we can move too far, too fast.

Our medium and heavy-duty planning approach is significantly different from our light-duty vehicle scenarios that were presented maybe last week. Light-duty can be seen as a somewhat homogenous type of market and we can use a fairly simplified planning approach for that.

I'll give you an example. We have quite a number already of light-duty vehicles in our service territory; by last count, almost 5200 as of February,

and they're growing rapidly. And these vehicles, of course, tend to charge in a relatively similar way. So planning for that is a lot easier.

The medium and heavy-duty sector, of course, is more dependent on specific business activity. For example, SMUD does not service any major ports in our service territory, like L.A. or Edison. And the mission duty cycles for the vehicles that could be electrified have very wide variations.

And so for example, our service area is dominated by smaller vehicle classes and local work trucks versus the long haul and the short haul trucks. So I think the theme that we have and I think what I've heard from others today is there's considerable variability in the type of vehicle that we need to accommodate, and that makes planning a big challenge for POUs that don't have the same resources as Exxon.

Next bullet, next slide, please. All right. So here is a bit of a snapshot of the data we got from our Black and Veatch Study last month. It's a bit dense, hard to see, so I'll try to walk you through it.

Basically, along the top these are projections of the number of electric vehicles that

may show up in our service territory, and the bottom half attempts to quantify the load, the energy load that those vehicles would place onto our system.

There are three cases that were examined, a 2020 case, 2025 and way out to 2030. And I think to get the gist of this it's best to read it from left to right, because on the left side is the light-duty, the projection or the estimates of light-duty fleets in Sacramento.

So for example, in 2020 their estimate's for as low as 435 up to 847 light-duty vehicles, but if you look way on the right for that same period of time we estimate perhaps as low as zero Class 7 or Class 8 trucks, and up to seven or nine.

So the lesson here is that as vehicles increase in size and complexity the predicted numbers in Sacramento County diminish quite a lot. And again, this makes the point that we're dominated by smaller class vehicles.

Next slide, please. All right. We do have a number of programs that we've been rolling out in the last several years to try to gain information, data on just where the market is. One very important program for us is the Electric School Bus Deployment Project, and that is with three school districts here

in the Sacramento area.

We call that our Community Partners Project. Basically, what happens is the school district installs the infrastructure and SMUD provides a rebate to complement other funding by CARB, the Air Resources Board.

And my understanding is that's Proposition 1b money. This particular project will involve 29 school buses, and I'm told that that's one of the largest, if not the largest, electrification projects in the country.

We're getting ready to have a celebration of that, an introduction of that in the next month or two, and this is important to us and we want to bring a lot of attention to it. We've also been involved for quite a long time in electrifying the 49er Travel Plaza on I-5.

I think we first started this in 2004 and we call this our hotel load sort of project for trucks, because instead of diesel to keep the cab comfortable, this allows truckers to plug in to run their lights, their air-conditioning, their heating, computers and other sorts of equipment that they have in the cab.

It obviously reduces air pollution by not

running diesel and it's a big cost-saver for the trucking company. And I'll give you a bit of a comparison. An hour of charging for one of these trucks or use of our electric service for one of these trucks is -- costs only about 12 cents.

Whereas, an hour's worth of diesel fuel is probably roughly about $3. So the savings are enormous. And I'll note that SMUD used AV 32 funds to pay for this project. We've also been working with truck refrigeration unit pilot projects, the TRUs.

And I'll mention a project that we've had with Penske Trucking. This is another AB 32 project, and again, funds that we got from selling our allowances into the market. We gave rebates to Penske Trucking to electrify doors at their warehouse, and they've electrified 15 doors so far.

We estimated the savings of that on a monthly basis are about 1600 gallons of diesel fuel a month, and that's obviously a huge savings and a lot less expensive for them. And we believe there's a lot of opportunity for TRU projects in Sacramento County, and of course, across the state.

We have also started what we call our Fleet Assessment Tool Evaluation, and that project is to

put data logging -- data loggers on SMUD vehicles to determine what can be electrified, what particular functions on the truck can be electrified.

And we hope -- we're using that for our own fleets and we hope to roll this out for customers as early as next year. We've also established an electric vehicle electricity rate, standard rate, flat rate, that does not have a demand charge, of course, to appeal to fleet owners who want certainty as to what their charging costs are going to be.

The jury's still out on the popularity of this flat rate for us. There haven't been a lot of takers on it. So we remain to be seen how effective it's going to be. And then we have our own Fleet Electrification Planning Efforts, which I'll get into in one of the next slides.

Next slide, please. Okay. So what are SMUD's ongoing planning efforts in the heavy-duty sector? We we're identifying target markets and developing business plans to support the market. Our focus is on local delivery fleets and utility and communication vehicles, and we are trying to think through and analyze the business cases that will be used to establish our program support.

The Black and Veatch Study is one of the key

components of this, but we also need data that's available from other sources, ARB, the CEC and the other utilities to help us think these things through.

We are supporting efforts by our customers to go after grant funding. An example of this was the School Bus Electrification Project, which obtained quite a lot of Prop 1b money, and we are planning additional pilot projects over the next several years.

Like Edison, we view ourselves as a clean energy adviser. We have a high level of trust here in the City of Sacramento and the county as to the kind of product that we provide, and we believe that we can use that trust in order to educate our customers about good electrification alternatives.

And of course, we're collecting data to support our business cases, and that will be plugged into IRP planning. All right. Thank you. Next slide. Okay. This is a slide that gives a bit of an outline of our EV fleet and EVSC expansion plans.

So you should read it basically left to right on the top half, where are we in our current fleet and where do we plan to go on both the fleets and our EVSC appointments. And as you can see in the

upper left, we have a fairly limited of EVs in our fleet at the present time, but we are aggressively planning for that expansion over the next four or five years to 2020, 2021.

And you can see that we hope to electrify a large portion of our fleets. Same thing with our EVSCs. We do have EVSCs at our facilities, but our ambition is to rapidly expand those over the next several years.

All right. Next slide. So in summary, we have completed an initial market assessment using our Black and V Study. We're trying to identify the approachable electrification market segments, those that will profit from electrifying, and the data that we're developing for that we will use and plug into our IRP planning process.

The business cases and the analysis are under development, and I'd just like to say that we feel like we have quite a few efforts on an ongoing basis that give us the data that we need to determine these applications.

But of course, cost and cost-effectiveness is the key and sometimes that's the data that's hardest to determine or to pull out from what's available. We really feel like we haven't collected

enough data on cost-effectiveness within Sacramento.

For example, last year as part of our resource planning process we presented a business case to management to electrify a certain market segment. Management felt like there wasn't enough data to give that project traction.

So we need to see more evidence of cost-effectiveness to convince management to roll out some of these programs. In looking at the IRP Guidelines and listening to Noel today, I appreciate that Staff here understands that the POUs often don't have as much information as the IOUs and don't have as much information as we need.

And in some part the Guidance may be asking for information that we feel like we can't develop. So flexibility for us, of course, and understanding that is very, very important. And I think in summary, unlike the light-duty market, we feel that the medium and heavy-duty market is just getting started, and there's a lot we have to learn in order to deploy these programs on any kind of volumetric basis.

But in the meantime we're walking the walk with our own Fleet Electrification Plan, and so we're doing what we can. So be happy to answer your

questions.

MR. MOON: Well, good afternoon. I'm Marvin Moon. I'm Director of Power Engineering for L.A. Water and Power, and I'm going to be -- I greatly appreciate the opportunity to discuss our approach to medium, heavy-duty electrification, as well as some comments regarding the Integrated Resource Plan approach.

I'll also be stating a few comments from the -- representing the Southern California Public Power Association. So I was the designee for that. Next slide, please. My brief comments go to talk a little bit about our plan, particularly what our IRP currently says.

We're going to talk about our plan and our approach. We're going to be talking about our strategy for infrastructure and rate for medium and heavy-duty and a few recommendations. Next slide, please.

Okay. You know, Mr. Brazil talked about how transportation is key. I mean, it's three times more greenhouse gas emissions than the electric industry. There's a tremendous opportunity for GHG reductions. Those that use the technology are going to save a bundle of money.

We have an opportunity to integrate our renewable resources as the grid becomes cleaner. And also, to be quite selfish, every electric vehicle is equal to half a house of load. So that's great. Next slide, please.

So greenhouse gas reductions, ARB says we need -- AB 32 says we need an 80 percent reduction in our greenhouse gas emissions by 2050. And so our Integrated Resource Plan already has a robust discussion about electric transportation.

And taking into account all of the programs they have, the renewables, getting off coal, high efficiency, energy efficiency, once-through cooling for our power plants and a high electric vehicle model, this is what the results are today.

Next slide, please. If you look at this graph here, this shows our trajectory as far -- this comes right out of our Integrated Resource Plan. This is our trajectory in how to get to reduction of greenhouse gas emissions.

But the solid lines represent everything but electric transportation. The dash line, the little brown dash line, that represents the goal. The only way, at least with the current modeling, that we can get down to that goal is with very aggressive

electric transportation program.

Next slide, please. But you need a lot of cars. You need a lot of cars and you need them to charge at the right time. How many cars? It's right there. By 2020 we need the equivalent of 145,000 cars in Los Angeles, but that's impossible.

That, even if we got the people to adopt 15 percent of new vehicle purchases, that will only get us halfway, maybe 70 or 75,000 cars. Currently, there are 27,000 in L.A. So how do we get there the rest of the way?

Next slide, please. Also, let's look at the CO_2 content, how valuable electrification is. Our current electric mix has 1100 pounds of CO_2 for every megawatt hour -- the equivalent megawatt hour of gasoline. Well, I'm getting ahead of myself.

There's 1100 pounds of CO_2 per megawatt hour. As we phase off of coal it's going to get down to 590. Compare that to gasoline at 2400 pounds. So there's a four to one advantage of fuel switching, basically, from gasoline to electricity.

Next slide, please. Also, of the eight programs in our Integrated Resource Plan, electrification is the only program that has the potential to lower costs of electricity for

everybody. That includes the Reliability Program, getting off coal, ocean cooling, renewables.

The far right corner you can see the line goes below the axis, and that's because if you have cents per kilowatt hour, if you can sell a lot of kilowatt hours with very little investment in the numerator, the denominator gets big and the cost of electricity gets cheaper for everybody. So everybody benefits.

Next slide, please. Okay. So and then let's factor in the renewables. We saw this slide earlier. The red represents our load. The blue represents our thermal load, and to the extent that as we add more solar the -- it's getting tougher and tougher for us to ramp down our thermal generations.

The plants aren't even designed to do it. And then when the sun goes down we have a two-hour window that eventually could be 3,000 megawatts, which would be tremendously difficult, as well. So let's use cars to help solve that problem.

Let's fill in the valley with car charging when we have too much solar. Let's not charge them when the peak comes in and everybody get's home at night at 6:00 o'clock. And how are we going to do that? We're going to do it four ways right there.

You can see prescriptive rates. Send the right price signals and already, a lot of the utilities are shifting their peak loads to later, as the solar load grows up. Also, eventually down the road after that there's going to be dynamic pricing, sending the right price signals at certain times of the year are going to be more important than others.

Also, we need the EV infrastructure to support it. In L.A. there's 20 electric cars for every public charger. Now, no one's going to buy cars unless they see some chargers out there. And also, load factor.

You can see our load is getting peak here. In fact, I saw a study not too long ago that showed over the next five years our sales are essentially going to be flat because of energy efficiency and solar and like that.

But the peak load is going to go up .9 percent per year, or almost one percent per year, and I have to be able to hit those peaks, which requires more investment without anymore money to pay for it. Next slide, please.

Okay. So here's the strategy. Here's how we're going to get to that 145,000. We're going to work and do everything we can to help increase the

adoption of electric vehicles, to the extent that our goal would be over the next five years to have 15 percent of new vehicle purchases be some version of plug-in.

Currently, in the state it's about three-and-a-half percent. Nationwide it's about .9 percent. So that's one thing. That'll get us halfway there. Then we're going to count public chargers and workplace chargers as EV equivalents.

We have about 400,000 cars coming into L.A. every day. Those cars can often, if, like if they're plug-in hybrids, can't go home electric unless they charge at work. So workplace charging is very important. Public charging's important.

And we're going to count that charging. It's almost like stealing charging from our neighbors. And the third thing is, we're going to consider non-light-duty or medium and heavy-duty as EV equivalents.

So if you have an electric bus that's like 20 cars. Now, we don't have a crystal ball to say the buses are going to take off or the drayage trucks or the yard trucks or whatever that's going to come up, but we're going to count everything that moves and has a plug towards our goal.

Next slide, please. Okay. So here are the six elements of our plan. It covers the education and outreach piece, the city fleets, the Residential Rebates and Incentives Program, the city infrastructure, commercial incentives, and there's the heavy-duty right there. That's one of the six elements.

Next slide, please. Okay. So here's our strategy for the heavy-duty. This is for the infrastructure side. This stuff's expensive, very expensive. So we got three buckets of money. The first one is we have our rebate program and our rebate program does have money for heavy-duty.

So that'll help take care of a bulk of the charger cost. And then on the right side of the screen you see that bucket of money service -- planning allocation. Whenever someone brings in a new service most utilities have an allocation of money, usually based on the size of the project.

In other words, the utility helps pay for part of the infrastructure to be installed, but it doesn't always pay for all of it, and that's the gap.

So between the charger help being paid for with a good chunk by our rebates, and our service planning allocation, the gap in between could be help

filled by some LCFS money. Now, we've been doing an analysis of, for example, the bus yards in L.A., and we found that 75 percent of them are slam dunks.

Even if you need seven-and-a-half megawatts for 100 buses or 15 megawatts for 200 buses, it's right there, because we're a pretty dense city. But the other 25 percent's going to need some help, but it's for the line extensions it's going to be a little costly to get the power to those particular sites. So that's our strategy for paying for the infrastructure.

Next slide, please. Okay. So here's some real life examples. This stuff is popping up right now. L.A. DOT just bought four DASH buses. There's a picture right there. They're running around downtown L.A.

Well, of course, the facility people don't talk to the fleet people. So when the buses came there was no chargers. So Water and Power ran out and got the chargers installed pronto to get them going. Metro is planning to convert the L.A. Orange Line.

That's the line that goes across to the San Fernando Valley. It's a bus line. Their plan is to put it -- start off with 10 buses. Eventually,

they'll have 43 buses. That's their first dip into converting a line. We've been out there helping them with four megawatts for charging for that.

The Port of L.A. This is going to be a yard truck demonstration to move those containers around. It's a very expensive installation, but this is great because this is our first opportunity to really try to take our -- we haven't identified what the rebate is for heavy-duty.

So this is our test case to determine what it is, and we think that if we could help solve -- figure out what the rebate is for that, it'll also help for DC fast charging. We can use the same model, not only for heavy-duty, but DC fast charging on a light-duty side.

Next slide, please. Okay. So rates, the fuel costs. So important. So two things. We see two areas that need some help. One is depot charging, that stuff overnight. I think we're in great -- we're in good condition on that one for two reasons.

One is, we have a large industrial rate for the bus depot situation, which has no monthly demand charge. And our off peak is 14 hours a day, from 8:00 p.m. till 10:00 in the morning, and on weekends

it's 24 hours.

Then layer on top of that we have a discount of two-and-a-half cents for kilowatt hour on this off peak charging. So if they can shift all their parking -- their parking -- their charging to off peak they're in pretty good shape with that rate.

But we do need to do something new, call it the anytime rate. There are going to be people, like some of these bus lines that charge opportunity charging as they go, that's going to need something for charging during the day, like a rolled in demand.

And that's a rate that we have to develop and that's very doable. Our plan for that one is we developed a very aggressive rate for ships that plug into the harbor, and it's -- they have the worst load factor you can imagine.

They come in once a week, 10 megawatts for a few hours. Then they leave. So let's scale that down to buses and DC fast charging. If we could do it for ships with that terrible load factor and compete against bunker crude, we can certainly do it for bus -- for electric transportation.

Next slide, please. Okay. So here's some recommendations. I showed you the importance of heavy-duty, how it counts towards our goals of

145,000 and that's how we're keeping track. So we're going to have to come up with a scorecard on how -- on chargers and cars and things like that.

We've also

Next slide, please. We've also inter-blended a variety of programs for both our light-duty, medium and heavy-duty infrastructure and also fleets in our consumer education piece. LCFS is very important.

We're just rolling that -- you saw how that -- we're using this for gap funding for heavy-duty. We're using it for about four other things, as well. And also, consideration. You saw the four to one advantage of switching from gasoline to electric.

Right now, the utilities don't get any credit for that. So I think there should be some consideration for that. Or not just utilities, anybody who makes investment in infrastructure should be able to get some sort of GHG consideration.

Next slide, please. Okay. So here's some SCPA recommendations. Of course, everyone fully supports collaborating with the CEC to advance analytics, to the extent, of course, that it's actually practical.

My caution to this, don't go overboard on

the metering. I know when I got my solar system at home I was checking it three times a day when I started, and then once a week and now I haven't looked at it for two years. So that's the way it goes.

POUs also need to expand and evaluate. We're doing everything we can to expand. We collaborate. We have a EV working group to get things done and Edison joins us on occasion with that group. When it comes to counting cars, don't count on the utilities to know where the cars are.

That's really DMV and POC data. I would say since CARB has to get the data anyway to do the LCFS allocations, let's rely on their data and share it with everybody, because that's expensive data. Next slide, please.

Okay. And again, the EV market's very small. I believe we've heard that before, as well. And so as far as -- I would lean more towards qualitative descriptions of what we're doing, rather than quantitative data points. So that's another thought.

And the other thing is, medium, heavy-duty sector is changing so quickly. The technology's changing. I'll give you two examples. We saw a

vendor the other day that said they had a package substation that could just drop in and connect primary voltage from the utility with built-in metering and built-in energy storage, and they're already deploying that with an EVSC company for rapid deployment of charging stations.

Also, the Port of L.A. and the Port of Long Beach are working together to develop a standardized plug that any heavy-duty operator can plug into, because they operate on a landlord/tenant basis and they don't want to be stuck with stranded assets.

They were successful before, developing the plug standard that's now used around the world for plugging in ships. So they have a track record that works pretty good. Next slide, please.

So if we're successful by the way we're counting things, we're going to have the equivalent of 145,000 cars in L.A. and we're going to be meeting our -- both emission goals and better utilization of our assets, as well. So thank you very much.

MR. CRISOSTOMO: Before we get started with some discussion I wanted to just let Commissioner or Chair provide a question for clarification.

CHAIRMAN WEISENMILLER: Yeah. Actually, just a couple questions. Be sort of curious, two

topics. One of them is, you know, we've talked about how do you track where things are going. And it seems like one of the things you've got a way about is clustering chargers and what that might do to your distribution systems.

How are you dealing with that? If you say it's a DMV's issue or, you know, the Air Board's issue, right, when --

MR. MOON: No, that's not.

CHAIRMAN WEISENMILLER: Yeah.

MR. MOON: Not my answer. We have several tools that we use to see what's going on in that regard. One is, I have two service planning people that all they do is help customers install level two chargers.

Now, over half the people installing light-duty don't even have a level two charger. They're just plugging in the wall, and that's not very scary to us. That's like plugging in a toaster. So it's the -- one of the level two chargers that we're interested in.

And so we get a lot of calls from customers, helping them, should they go on the special rate or should they do something -- how -- there's several ways they could hook up to service. So we help them.

We also have access -- since we're an integrated city we have access to city permits, and they actually have a permit for EV chargers.

So we can see what people are doing that regard, as well. Plus, and again, the data we receive from CARB as far as where some of the cars are helps. That's helps, but all that to say is in all the time that we've done -- at least on a residential side -- we haven't had to upgrade any transformers with what we've seen so far.

MR. WESTERFIELD: I'm afraid I can't speak to that specifically. My understanding is we have done at least one study, perhaps more, on the need for transformer upgrades, if certain fleets do go ahead and electrify, as we hope they will.

That has not happened. We have not had very many fleets. We haven't had any fleets that I know of that have really electrified. We've had a lot of interest. I can think of maybe three, four, five companies that have approached us with the interest in doing it, but it hasn't happened yet. So we don't have that experience with clustering yet.

MR. WATROS: We have looked at the distribution planning.

CHAIRMAN WEISENMILLER: Sure.

MR. WATROS: And our system is fairly compact and fairly robust. So we don't see any particular areas that we would have an overall problem, even though on the solar side we have a few distribution circuits that are limited for additional solar. But on the load for EV charging we don't see a problem at this time.

CHAIRMAN WEISENMILLER: My next question, you know, we've all talked about using the batteries to help on a grid integration. We obviously are doing some vehicle to grid demos, but there's not a lot, frankly, nationwide.

We looked the L.A. Air Force Base; you know, and it certainly beats having one car in New Jersey, say. But anyway, you know, we've done vehicle to grid either two-way or one-way, but what are you -- are you doing anything at all in terms of R&D on vehicle to grid so we can convert this hope to a reality?

MR. MOON: Okay. I'll start. Actually, we have. At L.A. we had the Smart Grid Demonstration Project, which was half funded by Department of Energy, and we did buy a V to G car. It was a Mitsubishi and we did a lot of experiments with it.

We've also been playing around with wireless

charging on that. I think what we found was, of course, it has a long way to go, because not only are -- would the manufacturers have to support it, there would have to be standards built around the thing so they all work the same.

Then also, you have to do the financial model, the back of the envelope. How much money would you have to pay for someone to actually do it? And I think what's happening is with the bigger battery cars coming out I think there's a little more of an opportunity to do it, because the short-range vehicles, who would give up what precious power you have. So we're playing around with it, but that's as far as we've gotten.

MR. WESTERFIELD: My understanding is we have not studied that in any detail. That sort of overlaps into the area of storage, and I have taken a look at some of the storage projects we've done over the last several years, and none of them have included electric vehicles.

I mean, we're still around the 5,000 number of electric vehicles. We have over 1 million residents, over 500,000 hookups. It's just too small a number to study that at the moment.

MR. WATROS: The only thing that I've seen

on that is with the complexity of doing that, depending on the grid services that you would look at, the vehicles' battery pack and system would have to be adaptable to that, and warranty issues and so forth and like that. So I agree with L.A., a long ways to go, unfortunately.

MR. MOON: I had one more comment. I think the real value is, like I said earlier, is getting cars to charge at the right time. I mean, that's huge. That's something all of us can do. And to that extent we're working on a Smart Residential Charging Program, which we hope to roll out in a few months, actually sharing data with customers and rewarding them for charging at the right time. So that's really important.

CHAIRMAN WEISENMILLER: You know, one of the things we've sort of tried on the IOU side, but without any success, is obviously you have a certain number of your own customers that -- your own employees that come in and charge, say, at the SMUD headquarters.

Now, the question is whether you could do anything with your own site there as you, you know, get more -- you know -- as you have more, basically, walk the walk and start putting in more electric

vehicles yourselves or your employees you're driving in, that could at least in theory become a much more controllable vehicle to grid demo that, say, trying to go out and find another air force base.

MR. MOON: That's really true. Our headquarters, we have 80 fleet chargers and 64 employees and 24 for the public. And we're getting a battery system to try out the little micro grid approach on our building.

CHAIRMAN WEISENMILLER: Right. Yeah. What about -- one of the things, one of the more interesting things in the past year has been basically, Beijing and Shanghai have said every taxi has to be ZEV, period, you know, at some time, but not in a month.

Given if you've ever -- you're in Beijing, not a hell of a lot of time for that conversion, and that's certainly a fleet. You know, it's like, how do we -- you know -- again, the big question is, we can push more towards the individual household.

We can try to deal with fleets. And so is there anything you guys can do with taxis, you know, as much as they're still alive?

MR. MOON: I'll say I saw an announcement about two weeks ago that one of the shuttle companies

for one of the parking lots at LAX is converting to electric. So I was really excited about that. And LAX is putting together a -- they're spending billions of dollars on that Inter-Modal Transportation Facility and consolidating all the rental facilities.

So we're working with them to talk about being really aggressive and over the top on EV charging, you know, for those facilities, because it's the opportunity to do it. They seem very receptive to that, as well.

I have talked to BYDs who has been instrumental with the Chinese ones. In China, I think it's very easy for them because it's very central to government, right.

CHAIRMAN WEISENMILLER: Yeah.

MR. MOON: With buses and taxis and things like that. And they said that one of the most important things to do on taxis is, for example, at an airport, is to have first in line rights. And that's the idea where they can get -- they can cut ahead of all the gas vehicles, because that's a big incentive to get people to switch over. That's what they've shared with me.

MR. WESTERFIELD: As far as I know that, the

issue of electrifying taxis has not come up internally. I mean, if you take a look around Sacramento these days, it seems to me the number of taxis that you see on the road have dwindled.

It's Lyft and Uber, and I would think, is my personal opinion, that since the economics of driving a taxi these days are tough in comparison to Uber it would be a hard sell to find the money to -- for taxi companies to invest in electric at this point in time.

MR. WATROS: Pretty similar to SMUD on that particular issue, but we are looking a little wider ranging into the regional transportation plans. And so I think that would encompass -- we're partnering, we may partner on a couple different projects with our Shasta Regional Transportation Agency.

So that might be an umbrella on the moving targets from taxis to Lyft and so forth. So stay tuned, I guess.

MR. MOON: I'd like to add one more comment. We have a network of 16 DC fast chargers in L.A. They're available for the public to use and actually, they're free. What we found out was one of the biggest users of that were Uber and Lyft drivers.

And so without even knowing it we helped

electrify a taxi fleet and we were very excited about that. And folks like Evercar, I know they went out of business, but they were big users, as well.

CHAIRMAN WEISENMILLER: Where does light rail fit in your strategy or subways fit here, you know, in terms of -- my impression was SMUD was trying to do the light rail to say Davis, you know. How does that fit in terms of tradeoffs between, you know, cars, heavy-duty, in your thinking, or L.A. subway, right?

MR. MOON: I'll start.

CHAIRMAN WEISENMILLER: Yeah.

MR. MOON: Metro is off the hook as far as putting in rail systems. In fact, we're just finished -- we're working on four of them at once. With Measure M they just -- they have plans out to 2061.

So they're going to continue putting in these things. They have the LCFS credits. They just cashed in a bunch. So they're collecting that to help support their operation to the LCFS Program. I think it's great.

I mean, I think we should do more with heavy-duty rail, if there's an opportunity for all the trains that come out of ACTA and Long Beach and

Port of L.A. So I think there's a great opportunity there and I applaud Metro for expanding those lines and keeping them electric.

MR. WESTERFIELD: I wish I could say the same -- have the same kind of optimism in Sacramento. I know that our light rail system is, again, very challenged for funds. I know of at least one project where they were supposed to participate with us in joint funding and they had to pull out because they didn't have the money.

Light rail in Sacramento is strapped for cash. I do know that they are very interested in the LCFS Program. They are using those credits and hopeful that they'll get some revenue from those credits, but I don't think they -- I didn't know they had the funds to expand to Davis. That's news to me.

CHAIRMAN WEISENMILLER: I think Picker, who was running the Board at one point was indicating that there was interest at your Board level in that.

MR. WESTERFIELD: I'll go back and ask him what's going on.

CHAIRMAN WEISENMILLER: Okay. Right. I did mention the L.A. Air Force Base. I understand from Ron Nichols that, you know, so we focused on the Edison part of that, which took a gawd awful long

time to interconnect, but I guess you also -- LABP has some potential connections into that, too?

MR. MOON: No. They're strictly out of L.A.

CHAIRMAN WEISENMILLER: Okay.

MR. MOON: Outside of L.A., so we're not part of that project.

CHAIRMAN WEISENMILLER: Yeah, bottom line, if you're looking for fleets, at least in theory, military bases have fleets that you can start pushing the vehicle to grid down, along with -- again, if no fleet it's pretty hard to make it work.

MR. CRISOSTOMO: So in a very quick few minutes -- okay. In just a very few minutes I did want to try to bridge the concept of starting from zero in a new market, which we don't have data toward analyzing cost-effectiveness and being able to model this in IRPs, and using a standard way of characterizing the vehicle and charging load.

We heard a variety of approaches to that, one with Marvin about the effective EV, and then with SMUD's study about the cost-effectiveness of electric transport versus other resources. How do we essentially start from zero?

How do we speak the same terms and eventually have more robust analyses and leverage

pilots and other -- in other service territories to the greatest extent to get along the trajectory that ARB, South Coast and San Joaquin we're talking about? Easy question.

MR. MOON: Well, again, just being selfish, start -- look at our IRP as far as -- at least as a start on how we -- how we're talking about the role of electric transportation and how it plays with the other initiatives that we have to get the overall goals of -- that matches greenhouse gas emission reductions, NOx emission reductions and keeping our rates competitive, because they're cost-effective differences and some are more expensive than others, different programs. So it's a starting place to look at, and build from there.

MR. WESTERFIELD: Noel, I think you raised a great question and the key, of course, is costs for our ratepayers. And we do have a number of pilots that have gone -- that we've learned something of. We have a few more in the works, but those pilots should provide some economic data as to how much it costs for us to subsidize these programs and whether there's going to be interest on the part of our customers.

I think it might behoove us to be a bit more

transparent with the finances of those kinds of projects, and find if one -- if L.A., for example, has found that a project for 1,000 cars or maybe 50 delivery vans is self-sustaining in a certain way, to share that financial data with others so that we can do the cost studies and benefit from that, because it's the cost aspects that sometimes, that data doesn't get shared.

MR. WATROS: As I mentioned in my statement, we're just starting out on our EV Program, but we have some pretty good analysts looking at our fleet analysis versus the CEC model, and we've been looking at that in parallel, seeing where the differences are.

So at this point in time I think we don't -- since we're so small we don't see a problem to answer just about any of the questions going forward. And as long as it's flexible and we're listened to like we are today I think we'll be all right.

MR. MOLINE: Well, like in any good negotiation, you want to achieve a win-win. And I think it's important for parties to identify benefits. What are the benefits of moving forward with greater electrification of transportation?

And while we're talking about, you know,

medium and heavy-duty vehicles today, I think the concept is, you know, goes for all electrification of transportation. So identifying those benefits and then identifying the impacts, as well, whether they're beneficial impacts or negative impacts.

Cost could be a barrier, but over time there -- you know -- over a lifetime they may not be a barrier. So it's important to look at them over different time frames, and I mean, like initial cost versus overall benefits.

Clearly, the Commission's interested in what the future is going to look like, what growth is going to look like. So there's value in trying to -- we talked a little bit or I had mentioned the opportunity to share that information as much as possible.

We don't have that ability. I think the ability to understand what the entire market looks like from the different players, we could share that information better. And then as several folks just alluded to, identifying what works and what doesn't work.

And I mean, we heard some cool things today already about, like, wow, you know, we're already funding -- you know -- your question about taxis gave

-- you know -- we got an interesting answer about, you know, Lyft and Uber drivers that are getting free service, as well as what's going on in China, getting first in line opportunities.

And those are the kind of things that if we don't know they exist then we don't -- we can't -- you know -- so Redding might say, hey, we need to think about that in our infant program and how we can, you know, as we imagine our program in our local community, our smaller community, let's look at that opportunity or how we can do that.

So that sharing of ideas is really important, as well. So all those things together sort of see -- indicate a body of activity that is both, you know, a regulatory element and then a very robust sharing element that we need to do, not just within the POU community, but just statewide and, of course, broader to the extent we can.

That's harder to do. You know, we want people to be able to share even what doesn't work. And sometimes, we're a little afraid to talk about those things.

MR. CRISOSTOMO: That's a great point to end on. We could stay and talk about this all day, but I'm getting the hook from Heather. So thank you four

for coming and sharing your ideas about Transportation Electrification and then your IRP, and we look forward to learning how we can share.

MS. RAITT: Thank you. And so we will actually just take a quick 10-minute break so everybody can have a stretch, but we'll be back promptly in 10 minutes.

(Off the record at 3:29 p.m.)

(On the record at 3:39 p.m.)

MS. RAITT: Shall we go ahead and get started with our second panel. Tim Olson, from the Energy Commission, is the Moderator.

MR. OLSON: Thank you, Heather. Thank you, Commissioners. I'd like to -- this panel is a mixture of some industry people, some -- a lot of different perspectives. And then we wanted to get some information on the record from their views about the direction of medium-duty, off road electric transportation, as a kind of an advice or recommendations to us, but also the publicly owned utilities.

And I'll introduce all the members first, the panel members first, and then we posed some questions to them earlier and we're going to ask them to comment on those. So Hannah Goldsmith is with the

California Electric Transportation Coalition.

Next -- well, and we have two people online that will comment online. The second person is Kanok Boriboonsomsin, who's with the U.C. Riverside Center for Research in a special program, Transportation Emissions Energy Health. It's a new institute.

Bill Van Amburg, sitting here from CALSTART; Adenike Adeyeye from Earth Justice at the very end of the table here, and then Chris Cannon sitting next to -- he's with -- Chris Cannon with the Port of Los Angeles sitting next to her.

And also on the line will be Fran Inman, who has -- wears a couple hats. One, California Transportation Commission and then she runs a company called Majestic Realty, represents a lot of real estate owners who are either terminal operators, material handling facilities, and I'll ask her to kind of elaborate on that.

So part of this is -- and thank you for joining us here today for this discussion. Here at the Energy Commission we use an expression that hardware on the ground successfully operating provides the insights, experience and motivation to help ground truth our future activities and investments.

Noel and I are part of a division that, as many of you know, deploy $100 million a year into the non-petroleum sector, and maybe a quarter of that is electric transportation and infrastructure. Each of you offers a unique perspective regarding the experience with medium, heavy-duty and off road electric transportation.

I'm hoping you will share your views about your experience, impacts of electric transportation growth, and of course, for the 2017 IEPR, recommendations to us and the publicly-owned utilities to facilitate and plan for infrastructure to meet growth.

I'd like to start with Hannah, and for all of our speakers I'd like to have you introduce yourself, whether you have any comments at this point or you expect to have comments on our Electric Transportation Guidance, that document that Noel referred to, and then comments on the questions that we raised to you earlier. And so we'll start with Hannah from CalETC.

MS. GOLDSMITH: Great. Thank you for having me. It's nice to be back here. You might have seen me two years ago when I used to work at the Energy Commission. So I'm Hannah Goldsmith. I'm with

California Electric Transportation Coalition, or CalETC.

We're a nonprofit trade association that has members, including utilities, both IOUs and POUs, as well as traditional vehicle manufacturers and vehicle manufacturers that produce medium and heavy-duty electric technologies.

And so we're interested in seeing the acceleration and advancement of Transportation Electrification among all sectors. So that's our interest in the medium and heavy-duty space. And we are planning to submit comments on both this Workshop, as well as the Light-Duty Workshop that was last week.

So you'll see those from us. And I'm going to provide a little bit of feedback on the Draft Guidance. So I'm going to kind of lump together the things that we support and then talk about the things that we have a little bit of feedback on.

And so for Sections 3, 4 and 5 of the Guidance, we support insuring that the TE Programs from the POUs will help meet state goals like air quality, climate change and alleviating environmental burdens on those communities that are most impacted.

We also agree that utility programs should

leverage existing funding opportunities, and we agree that the utilities are situated in a really great position. They communicate with their customers very often. So in terms of education and outreach that's really important.

So moving onto the two areas where we have a little bit of feedback, on the data sector, because CalETC aims to see market acceleration for TE -- when I say TE I mean Transportation Electrification, so used to using all the acronyms -- we aim to see acceleration in all sectors.

And the medium and heavy-duty sector is behind the light-duty sector, but there are a lot of promising advances. So for perspective, at the end of 2016 the light-duty plug-in electric vehicle market represented only slightly more than three percent of the new vehicle market in California, and less than one percent in the U.S.

So we still have a long way to go on the light side, and definitely on the medium and heavy-duty side. So we recognize that data collection is important and -- but we're most concerned with getting the vehicles and infrastructure deployed.

Our preferred approach to data collection would prioritize the information necessary to advance

the PEV market, and we think that the Guidelines should be narrowed to achieve this and be as simple and straightforward as possible.

It was great to hear Noel talk about how important flexibility will be with these Guidelines and understanding how unique each POU service territory is, and how they'll be able to basically comply with the Guidelines and insure that their applications include the data that's requested, whether that be qualitative or quantitative, and what they're able to provide and what they don't have access to.

So we'd like to insure that the types of data collected have a clear nexus to the problem being solved. We've submitted some comments regarding the Energy Commission's Title 20 Proposed Data Collection Regulations, as well.

It's a parallel effort, and one of the recommendations we had there was that the Energy Commission, as well as the other agencies that are interested in collecting all this data, form some sort of work group where they involve experts on data collection, as well as those that are undertaking data collection efforts on these topics, to kind of get an idea of the landscape of what data's already

available and what are the gaps, so that we're not duplicating efforts.

So regarding the vehicle grid integration portion of the Guidance, we support the current and proposed efforts by utilities to send pricing signals and explore more complex methods of achieving integration, like PG&E's BMW Pilot and like the L.A. Air Force Base Pilot.

When it comes to communication standards we recommend focusing on more near-term VGI solutions, like pricing signals, but we think we're pretty far from where we need to be in terms of numbers of vehicles.

To adopt something right now we would recommend being careful about planning the future, because technology is changing so rapidly, and we want to insure that innovation is not stifled and that the market continues to develop and expand and is successful.

So overall, in terms of this collaboration is key, I think you heard that a lot today. We want to see everyone sharing lessons learned and bringing everyone together so that we can move forward more successfully.

And finally, we're also asked to provide a

little bit of information on the type of data that our organization collects about how to plan for TE. So CalETC undertakes what are called Transportation Electrification Assessments.

We have three phases of this. They're available on our website, but they look at the environmental and societal benefits of electric vehicles and the grid impacts. So Phase Three, Part A, which I'll call T3A, was released in January 2016, and this looks specifically at commercial and non-road vehicles.

And so it includes adoption scenarios, energy consumption forecasts, load profiles of multiple, medium and heavy-duty and other technology, including trucks, buses, forklifts, as well as truck stop electrification and electric truck refrigeration technologies.

And overall using the total resource cost test and societal cost test, we found that all market segments showed significant per vehicle or facility net benefits, as well as economic and societal benefits for California as a whole.

We also do other research, and I promise I'm finishing up. We recently released our report in collaboration with Plug In America that looks at

different methods to encourage electric vehicle adoption, and it's a review of reports on incentive effectiveness, all kind of incentives, specifically for California utilities to help them with engaging in this market. Thank you.

MR. OLSON: So Commissioners, can we just continue on with the -- yeah. Okay. So Bill Van Amburg, if you could then go next. And you know, you have a lot of insights about the evolution of markets, just for a couple different reasons.

You're the administrator of the ARB's HVIP Program, and you have lots of members and you're facilitating development of projects with your members at CALSTART.

MR. VAN AMBURG: Great. Thank you very much, and Chairman Weisenmiller and Commissioner Scott, thank you for holding this Workshop. We as a nonprofit, clean transportation technologies, consortium, about 165 members, really are focused on speeding commercialization.

And one of the areas where we really are seeing commercialization finally start to take off is in this medium and heavy-duty sector. It's very exciting. It's taken many years and it is behind light-duty.

But as Tim mentioned, through a lot of our efforts we do administer the HVIP Program and similar programs, actually, in Chicago and New York State at the moment. And in fact, to an earlier point, there are -- you can incentivize electric taxis.

We have a program called Clean Taxi or Green Taxi in Chicago that is actually using a very small amount of voucher money to actually get electric taxis on the road in Chicago. So that can be a tool.

But as we look at the medium and heavy-duty sector, one of the things that really stands out -- so I'll have some comments that I think interweave observations on your Guidance to the utilities, as well as kind of some key points that we see.

And this is derived from our HVIP Program where we're really having to do some market projection work now to be able to send the right signals back to the Legislature and to ARB about what to plan for in terms of incentive amounts.

A program that we ran for several years and still have going, an E-Truck Task Force to identify the barriers to electric truck deployment and use, and then our Commercial Electric Vehicle Working Group, which in advance of the PUC process tried to bring together utilities, users, manufacturers in the

E-truck and bus space to understand what those issues were.

We're seeing several things that come out of that. First, it is happening faster than I think most people understand. We've just put some market projections together for HVIP through 2020, which is about as far as you can count noses very well.

We're seeing a doubling of the amount of medium and heavy-duty demand for vehicles. So we're currently, we'll be at around 800 vehicles a year. That will go up to 1600 plus vehicles per year by 2020. So we're starting to see that step up just within the HVIP Program itself.

Buses are a core backbone of that, but it's now starting to really grow out into the truck segment, medium-duty trucks, in particular. So that's number one. And I think as that starts to expand, what I don't want to see and we gave comments on this to the EPIC Program docket, is us fall behind the curve.

We've been very nicely ahead of the curve on light-duty. I'm a little fearful that we've put off heavy -- medium and heavy-duty for a while, because it wasn't happen for a while. Now would really be the time to make sure from a infrastructure and

utility planning perspective we do get ahead of this curve.

I think some utilities, and Edison has done a good job of trying to get their arms around it, have done a lot. Other utilities haven't seen as much demand. So they need help. We really think the Section 1 in your Guidance is really important, as well as Section 5.

We do think utilities do need to coordinate. This is not just a utility jurisdictional issue. This is cross-jurisdictional. Particularly, we have lots of public and private utilities that are intermixed. We need to do broader regional or even statewide planning for that.

We also -- the phasing is really important. We're helping ARB right now develop a three-year funding plan for medium and heavy-duty vehicles as part of their AQIP and climate change investments. And as we're doing that we've had to develop kind of a strategy for, okay, when do we invest what and where.

And as we've looked at that it's really important to start recognizing what will be the phase-in timing and the applications. And so we've seen really a huge beachhead in the on road market in

transit bus, transit bus both for transit properties and, as we heard earlier, also in universities, campus settings for large businesses like Google and others.

So that large bus segment is not just anymore in the transit properties only, and you have to start planning for this load showing up in other locations you hadn't anticipated. It will also start to phase out pretty clearly, we think, through shuttle buses, medium-duty delivery vehicles and those applications, and then into yard tractors.

And then we're going to see more and more into the port environment, with some electrification in cargo handling equipment. And then we're going to see with range extenders it get into medium and heavy-duty or heavier-duty regional delivery, which will include drayage out towards the 2025 time frame.

As we do this we -- those load factors are completely different for those vehicles. The domicile locations for them are completely different, the charge factors, but I think we can start to get a handle on this.

We've developed a transformational model with ARB. It will be something that will start to roll out, I think they'll be unveiling on May 9th as

part of their three-year investment plan. But I think sharing this kinds of information will be really important to help all the utilities kind of get a better visibility into what to expect, by what time and what kind of vehicles and what kind of domicile locations might those be located in.

But we don't have good data on this, and we would really encourage the Energy Commission to seriously consider across its programs how to help the utilities and the regions plan adequately for this medium and heavy-duty introduction.

So this right now is pretty important to us. When you really think about it, even 50 transit buses in one location is more peak load demand than the Transamerica Pyramid. So that's a lot in one place. Now, it's not all day, but it is a big peak demand.

Now, if you think about 50 dray trucks in one location or 200 delivery trucks, those are big load factors that are not in the traditional places we've planned for light-duty. So again, we would really encourage, we think your guidance is overall good, and we would really want to stress this getting ahead of the curve on planning, getting vehicle timing, load demand factors better pulled together on behalf of all utilities in the state would I think be

useful, rather than maybe just pushing it individually to each utility; maybe building across. And I think more resources need in that space.

MR. OLSON: Okay. Next, I'd like to have Chris Cannon provide some comments, and if we can line up Fran Inman to follow Chris, if that's possible. She's going to be calling in online.

MR. CANNON: Thank you very much, and good afternoon, Chairman Weisenmiller and also Commissioner Scott. Thank you for inviting me to be here, and it's a pleasure. My name's Chris Cannon. I'm the Chief Sustainability Officer at the Port of Los Angeles.

We're not planning to offer any formal comments on the guidance, other than to offer my appreciation and to applaud them. We think that what you're doing is part of a broader effort that needs to occur and is starting to occur across the state and even beyond, and that's comprehensive goods movement planning.

As we move toward having to face the very critical challenges that we're facing with climate change, and also the continued need to reduce health risk in the environmental justice communities and so forth, we've got to start to prioritize our resources

and funding and planning, and certainly coordination with stakeholders.

And so this kind of guidance with the thinking behind it is part of that. So I'll give just a few comments on what we're doing now and leave the rest for any questions that you may have. Our goal is to get as many pieces of zero emissions equipment operating at port terminals as we can by 2030.

Batteries are going to be the limiting factor there. Battery technology is slowly developing, but it's not anywhere near where it needs to be. So we actually appreciate -- the Energy Commission has helped us with some testing of some battery equipment versus other equipment that's considered zero emissions equivalent in order to look for other opportunities to move in that direction.

Our goal is also to have on road trucks that serve the port, the drayage operations, be zero emissions, as well. At least 40 to 50 heavy-duty zero emission trucks will be tested throughout the state over the next 18 months, and I think the majority of those will be battery electric, and many of those will be in the San Pedro Bay.

But battery technology is even further

behind here. The range for these on road trucks is very limited, 100 miles or less, and so electrification there is going to have to be based on duty cycle, meaning short haul, probably sooner, and medium and longer-haul probably later.

We're doing a project at our Pasha Terminal that I won't get into details, but we're pretty excited because it has the opportunity to actually supplement the grid. We listened to Marvin Moon talk about how you have problems with peak -- excuse me -- peak usage and so forth.

And so this actually will harvest solar power, store it in batteries that can be -- in this case the batteries work well enough and they can be used off peak. And then with all this we anticipate that we will at least double and probably quadruple our electricity usage over the next 15 to 20 years.

So as I said, lot of planning is needed. We're looking at 200 megawatts or more of possible need there. And it's going to cost a fortune. Just as an example, if we have a 100 yard trucks, and those are mentioned by Marvin, as well, if you have 100 yard trucks you're going to require maybe 10 megawatts of power to charge those, and that's 25 to $50 million in infrastructure just to support those

100 yard trucks. And those are just a small part of what occurs at every terminal.

So looking ahead, our biggest electrification planning issue we have here at the Port of Los Angeles is power delivery. Our grid was designed and installed in the 1940s and 1950s, and it was designed using a topographical model, meaning it was designed to service areas of the city, and not necessarily particular types of uses.

And so in each of the areas is assumed to have a mixed user profile, residential, commercial and industrial. So when you had at the time occasional power outages in different parts of the cities it wasn't as much of a problem.

The city was still growing. But now, as the city has grown so much you have areas which have much higher power needs and where the impact of a power outage is much, much greater. With heavy-duty industry, when you have a power outage you have emergency systems that cut in.

It sometimes takes hours to get equipment up and running again. It costs a lot of money and it can be very expensive in that some of the equipment can be damaged. So the DWP has done a great job of dealing with these, but even they don't have all the

abilities to handle these kinds of problems in heavy industry areas like our at the port.

So we recommend that utility lines need to be upgraded. We need to think about that. A minor hiccup, as I said, can be very expensive. Consistent, reliable power is needed. Ultimately, we need to identify areas that need even dedicated lines, based on power usage and priorities.

Some areas are going to need very high voltage, and so that's going to need to be thought about and planned for. And this is stuff that we are already working with the Department of Water and Power on.

But green power generation, I'd be remiss if I didn't bring it up. We're talking about all this kind of electrification. The power, however, has to be generated in a way that's green or we're wasting our efforts.

All you have to do is go to China and Beijing to see all that smoke that is occurring there and it's because of carbon power -- carbon fire power plants. And we also, interestingly, and this is something you don't always think of, have to find a way to responsibly dispose of and recycle used batteries.

As battery technology continues to grow this is going to be an issue, and it's not easy to get rid of that stuff and recycle it. Earlier today it was mentioned, charging standards and manufacturing standards. There is an outfit called Underwriters' Laboratories.

If you buy a lamp for your house, for instance, it's made according to certain standards and safety requirements, and these things are always done. Nobody even thinks about them anymore. There are no safety standards set for electric vehicles right now.

They're all just kind of being manufactured by good engineers who are very smart, but there needs to be a common Underwriters' Laboratory type set of standards for the manufacturing. And then the charging themselves have to be standardized.

Any of you who've traveled overseas it's not as bad as it used to be, but if you wanted to plug in a hair dryer or a phone these days or whatever, you have to have a common plug. Well, the same is true with the kinds of equipment that are being plugged in.

We've got many different manufacturers making electric vehicles. They all have their own

plug. So you need to standardize that and it sounds simple. It's actually not. And then, of course, as was mentioned, rate structures have to be based on strategic pricing in order to incentivize electrification, and otherwise strategize.

So I could keep going. I tried to go over it very quickly and I'm happy to answer any questions, but I think that at least covers some of the main issues that are of concern there. Thank you.

MR. OLSON: Thank you, Chris. So could we go to the phone and ask Fran Inman to make her comments? Fran, are you there?

MS. INMAN: I'm here. So thank you very much. And first of all, I apologize for not being able to join you. I tried but Southwest didn't work with me today. So here I am, back in my office. So first of all, I really think that it's fascinating to have these discussions and to hear different perspectives.

I think Chris's summary probably summarizes what I'm seeing on the most part. And I guess I should back up a little bit and tell you about my couple of the hats I wear. So one hat is Vice Chair of the California Transportation Commission.

So in that regard we're responsible for worrying about all types of mobility except the High Speed Rail, which is a separate Commission. But other than that, clearly, our transit partners are light rail partners, all of our freight partners, active transportation.

So we spend a lot of time working with our various state partners, as well as our external partners, whether they're MPOs or our industry partners. So appreciate the ability to participate today wearing that hate.

I think in terms of the energy requirements, we are in the midst of all of the discussions on the sustainable freight strategy, which I think kind of zeroes in on the heavy-duty and the medium-duty discussions that we're having today and how do we balance those legs of the stools, though, all at the same time.

So how do we reduce our emissions and increase our competitiveness and our efficiency, and make sure that we're moving all of those at the same time. So delighted to be in the midst of those discussions.

And my day job at Majestic Realty, we're commercial real estate developers with a portfolio of

90 million square feet across the United States; a little different from many of our competitors in that we build and hold.

So we actually got into these supply chain discussions from hearing from our tenants, the likes of which would be Mattel, Target, Home Depot, you name it, when they couldn't get their goods from the port and I was sent by our chairman down to see what was wrong.

And I'm sure he thought there was one signal or one intersection that needed a traffic signal or something. But that was probably about 15 years ago and how I began my journey of really studying the supply chains and goods movement.

So delighted to be a continuous student, and I was just down at our ports early today with more discussions. But I think, you know, what Chris talked a little bit, about the scale, and I think on the heavy duty cycle and the sheer size of the operations, particularly in Southern California, scale matters.

So I think it's particularly important for all of us to get it right. Also, the reliability is an issue I think for all of us to think about. You know, it's one thing for us to lose power in our

office, whatever. We don't like that, but it still could happen.

But if we have an 18,000 TEU vessel that's just arrived and we lose power, you know, what do we do? So I think that we on the movement side totally appreciate the externalities and the changing, continuous shifting that we have to be ready for, and make sure that we can adapt and be flexible.

So I think as we move to the Transportation Electrification I would agree with those that have said, you know, we're a little behind on the heavy-duty sector. You know, I look at where we are, just I think I read that California ranks 47 out of 50 in terms of just the traditional adoption of the latest motors and engines and everything on our trucks.

So we -- you know -- we're a little bit I would say fragmented in terms of this huge, huge undertaking. I think we -- the number is 16,000 port trucks and drayage just at our ports. So we've got a fragmented market.

I think that looking at the incentives and the alignment, I think we've got to, you know, watch what these pricing signals can be. How do we collectively figure out where to start first, would be my recommendation, because I think that there are

some applications that are just more natural that we can get some early success with.

I think that, you know, really, for all of us the origin and destination studies to really figure out and get some good data, our ports are doing some amazing work with trying to gather the big data that's been sitting out in all of these different silos, and we're just in the midst of a pilot right now about how can we make better decisions based on what we're learning.

And that's just on the port side, and imagine what we can do with better information. Meanwhile, we've got -- what we're seeing on the warehouse logistics side are all of these demands, heavy commerce.

And as our retailers like to say, to move from bricks to click. And what does that mean in terms of the transportation requirements and how do we fill those? On the warehouse distribution side we have yet to see much migration.

We see with our partners at UPS and FedEx where their -- you know -- scale matters for them and they have more of the alternative fuel, but for the rest of it we are not seeing -- we're not hearing from our customers that they've seen significant

changes yet.

So I'm happy to answer any questions, but I just want to encourage everybody to keep talking and keep these discussions going of how best that we can move together in a very effective and efficient manner, because I'd say beware of the unintended consequences.

MR. OLSON: Thank you, Fran. Could you stay on the line for another 10-15 minutes, if there are other questions?

MS. INMAN: Oh, sure. Yeah, I'm good. I'm good.

MR. OLSON: Okay. I'd like to go to our other caller on the line next, and that's Kanok Boridoonsomsin, with the U.C. Riverside TEEH Institute, and he has -- he's going to do a presentation, short presentation from afar.

MR. BORIBOONSOMSIN: I'm here. And thank you for the opportunity to be part of the program today, and I also apologize on not being able to be there in person. So today I -- we offer perspective from our Research Academy on the Draft Guidelines.

And first of all, let me introduce myself a little bit. So I am part of the research faculty at the University of California at Riverside, College of

Engineering, Center for Environmental Research and Technology, or CE-CERT. And also I'm the lead for UCR in the newly founded center called CARTEEH, which I talk about in more detail in one of the slides.

Now, let me get back to the Draft TE Guidance. My background is in transportation, and once I have gone through the Draft Guidance I see a lot of similarities between IRPs and long-range transportation plans, that is, to plan for network capacity in support of increasing and often fluctuating demand.

Now, with that context I would like to encourage further data to be collected by customer type as much as possible. This is item number one in the Draft Guidance. And there are two major benefits to that.

One is obviously that we allow for more effective policy-making for Transportation Electrification, and also, in a broader sense, that will also enable the coordination with other transportation of quality programs or policies.

Just to give one example, we have collected some data from drayage trucks in California and we see significant differences in operating patterns between those that serve the ports of Los Angeles and

Long Beach with the one that serve the Port of Oakland, and the reason is that at the ports of Los Angeles and Long Beach there is the Off Peak Program that encourage some truck traffic to move to nighttime operation.

So that means that there are a lot of miles during the nighttime a lot, and that also means that there's a lot of energy usage during the nighttime. And this is totally different from the ones that serve the Port of Oakland where everything has been during the daytime.

And what does this mean for electrical load profile out to POU? We have to respond to these additional loads in the future, for just one example. In the next few slides I will kind of go through some of the research related to Transportation Electrification that have been conducted at CE-CERT, and then in the last slide I will also introduce the new vendor, CARTEEH.

So aside from the large scale data collection in the previous slide, we have also conduct many measurement studies of alternative fuel. We got technologies from electric Class 8 trucks all the way to hybrid construction equipment.

And mainly, these are to -- can have poor

independent verification of the vehicle performance and in some cases emission performance, and there is -- basically help increase consumer confidence and hopefully promote market adoption of these new technologies.

Would you mind a step to the previous slide. Thank you. So one thing that I'd like to point out about the collection of truck activities data is that these data are now becoming more and more cheaper to collect with the new sensor and data locking technologies.

So we are able to get data down to second-by second-level, which is very high fidelity, and that can be used to do a lot of things such as determine the suitability of a truck for electrification. The data can be also used to estimate the monthly or annual energy demand if they're fully to electrify, or it can also be used to estimate a time of day load profile, as mentioned earlier.

Next slide, please, and then also next slide. Another study that we are involved in right now is actually being funded by CEC. This is called Eco Friendly Freight Advanced Traveler Information System, which is the integration of operational, as well as environmental performance improvement

technologies for improving drayage efficiency, and there will be a one-year demonstration of these integrated technologies at the Port of Los Angeles starting in next year.

And this is in collaboration with the Port of Los Angeles, Productivity Apex, and Informagnus. The key output that will come out of this project is the real world data load at the fleet level, as well as the vehicle level for a year, and then that will be a very viable data set that can be used for, for example, modeling the electric grid sizing and charging needs for the fleet, or looking at the impact of vehicle electrification on fleet operations.

With a shorter range, how would the fleet have to adapt to that and be able to still serve their customers. It can be used also to look at the overall cost savings for the fleet as a policy of greenhouse gas and emissions reduction.

Next slide, please. And as I mentioned, I also representing CARTEEH today and it stand for Center for Advancing Research in Transportation Emissions, Energy and Health, and this is established last year with five-year funding from the U.S. Department of Transportation.

It consists of Texas A&M, John Hopkins, Georgia Tech, U. of Texas, El Paso and ourself, U.C. Riverside. There will be both research and educational components that will be going on under the umbrella of CARTEEH.

And in n terms of research, in the first year of the center we have two projects lined up that will happen in California. And one of them is the duration of energy and emission benefit of electrify and connected trucks for drayage application.

And the other one will be looking at truck emission exposure at seaports and we'll be conducting emission exposure measurement down at the ports of Los Angeles and Long Beach. The unique thing about this center is that it bridges two research domains, transportation and public health, that traditionally may not have been kind of working together.

So it will allow us to look through the lens of what happened from the transportation side, how it impact -- or how did the emissions generated from transportation sector impact public health on the other end.

And for this new center I think one other thing that I'd like to point out is that so far, most of our research at CE-CERT, even in year one of

CARTEEH, has been focused on the demand side, which is the trucking side of the equation.

With the Draft Guidance and with ongoing and also upcoming effort from the POU, we will have hopefully more data on the supply side so that we can model different what if scenarios of policy that can be used to support the market intervention of Transportation Electrification.

And we'd be happy to be a resource to POU or a partner in whatever capacity that we may be able to contribute. And that's the end of my presentation and I'd be happy to answer any questions.

MR. OLSON: Okay. Thank you. And if you're willing to stay on the line here a little bit when we go through our Q&A. So our last speaker here in the room is Adenike Adeyeye, with EarthJustice, and I suspect you've now heard comments from everybody here and I know you have views on a lot of these different topics.

MS. ADEYEYE: So thank you, Chair and Commissioner and Neal and Tim -- Noel and Tim, sorry. My name's Adenike Adeyeye, and I'm a Senior Research and Policy Analyst at EarthJustice. Just to explain EarthJustice, we're a public interest environmental law firm, and I'm not an attorney. Feel like I

always need to say that.

And we are representing a couple of groups in the IRP processes here and at the CPUC. So here we represent -- actually, here and at the CPUC we represent Sierra Club. And then in the Public Utilities Commission's Transportation Electrification proceeding for the IOUs we're representing ECR Communities for Environmental Justice and the Center for Community Action and Environmental Justice, two environmental justice groups in Southern California.

So I'm going to be speaking kind of broadly about the issues that we've seen representing all of those different groups. The reason that we and our clients care about this issue so much is, first of all, the issues that were raised by people from the San Joaquin Valley Air District and the South Coast Air District, and ARB that -- to meet air quality standards we're going to need to transform the transportation system.

And then also, on a more localized level, the fact the communities of color are living in areas that are highly impacted by freight pollution is a result of environmental racism, and we see this opportunity to transform the transportation sector as an opportunity the POUs have to address those issues

of environmental racism California in a direction that I think we all want to take it.

So we think this is a really exciting opportunity to be involved here, and see this other place where a lot of progress can be made. I have four different points that we just had, based on the Draft Staff Paper.

The first is that I know the Staff Paper says at least one scenario should highlight meeting the policy goals. We would say that, you know, all or all but one should highlight meeting those policy goals, because if you're -- you know -- if you're not planning to meet them, then we're planning on failure, almost, and we don't want to do that.

Our second point would be that the IRPs should include both a quantitative as well as a qualitative analysis of the results of efforts to address air quality in disadvantaged communities. I see the qualitative pieces there and that's very important, but there's also a need for quantitative benchmarks to show where we're making progress.

It'll be hard to figure out whether we're succeeding and what, you know, changes need to be made if we don't have quantitative, as well as qualitative analysis of that effort. The third is

that the IRPs should describe how much of their investments in Transportation Electrification are being made in disadvantaged communities or in places like the ports that are adjacent to disadvantaged communities.

We need that information, again, to show, you know, what investments are really being made to specifically target the areas that are most impacted by freight emissions. And then finally, my last point on the Draft Staff Paper is that using CalEnviroScreen is, you know, a great idea.

It's not perfect, but it's been vetted. It's, you know, the thing that's consistent and consistency, as everyone else mentioned, is very important in this effort. And then one of the questions that Noel and Tim raised was thinking about data and analyses that have been helpful for informing our advocacy.

And I wanted to just shout out, I guess, a couple of things that might not have already been covered, again, echoing I guess -- echoing the Air Districts that the air quality plans they've put together have been very important for us in identifying the need.

Also, the Multiple Air Toxics Emission

Exposure Study that South Coast does has been very important for us for identifying the need for addressing particularly diesel particulate matter and other carcinogens in South Coast.

ARB's also done those kinds of studies in different areas that are impacted by freight across the state, and those are really important resources. Also, the communities that are most impacted have, in many places, been trying to do their own monitoring and been, you know, successful in getting funding and support for those monitoring efforts.

And I think it's important for all the people involved in this process to be aware of that. Just as a couple of examples, Comite Civico Del Valle is in Imperial Valley and they've been monitoring their own, you know, local air quality for I think the past couple of years, and they've had a lot of success with that.

And then the West Oakland Environmental Indicators Project, which is a group that's based on West Oakland near the Port of Oakland, just started a community monitoring project with EDF, the Environmental Defense Fund and Google, monitoring air quality at a very, very local level.

And so partnering with those kinds of

efforts to see, can show how the efforts and the investments that POUs are making are affecting the communities that they're serving. I'd also say, I mean, just on a -- in terms of the qualitative data, talking to the communities that are most impacted is very important.

The community groups that we work with, East Yard Communities for Environmental Justice and Center for Community Action Environmental Justice are two good examples, but then there are groups all of the state. You know, I'd recommend that the utilities get in touch with the groups that are within their regions.

I feel like there will be a group in every region that people should be communicating with and trying to see how these efforts are actually playing out on the ground. And then there are a couple of reports that haven't already been mentioned.

The Union of Concerned Scientists did a report on buses and trucks and electrification that we found very helpful. And then also, a coalition that are our clients and we are a part of, the California Clean Air Freight Coalition put out a report I think two years ago or a year and a half ago about that coalition's vision of a sustainable

freight system for California, and that includes both environmental groups, environmental justice groups, public health groups.

So it shows what we would like to see and kind of outlines the areas that we're excited about in terms of, you know, opportunities for electrification soon and now, soon in the -- you know -- hopefully, not too distant future.

So those are the various types of data that we found helpful, and thank you again for the opportunity to speak.

MR. OLSON: Thank you, Nike, and that kind of reminds me of another comment. We're very interested in getting some of the studies that were referenced here in our docket. You can either do that through e-filing or send it to Noel or me and we'll do that; and of course, your written comments if you have any in our docket, too.

So Commissioners, you have -- turn it over to you for some quick questions.

CHAIRMAN WEISENMILLER: Yeah. Let me just start off with a couple questions. First, I just wanted to thank Fran again for being here, or at least now for being part of this, although not being here. We would have preferred that.

MS. INMAN: I tried.

CHAIRMAN WEISENMILLER: I guess putting on your CTC hat, you know, obviously, we're talking about really significant investments in this state's infrastructure as we try to move to zero emissions. How does it fit into where we stand on our infrastructure -- highway infrastructure investment at this stage?

I mean, how far -- well, CTC, as you said, does everything but high speed rail, but you know, realistically, how do we add more infrastructure needs into that overall equation? You still there, or did I leave you speechless for once?

MS. RAITT: I think we muted her. Could you unmute Fran? Is Fran unmuted?

CHAIRMAN WEISENMILLER: She was --

MS. INMAN: Hello?

CHAIRMAN WEISENMILLER: Hello. There you are.

MS. INMAN: There I am. Okay.

CHAIRMAN WEISENMILLER: Yeah.

MS. INMAN: I was talking away.

CHAIRMAN WEISENMILLER: That's what I figured.

MR. OLSON: I don't know.

CHAIRMAN WEISENMILLER: Particularly on transportation infrastructure.

MS. INMAN: It's not like me to be quiet.

CHAIRMAN WEISENMILLER: Right.

MS. INMAN: Yeah. The challenge is we have been mostly underfunded on transportation infrastructure for a long time. The current push, and you know, thankfully, we did have SB 1 that was passed, was trying to help us get back to at least a state of good repair and do a little bit of catch up, but we still, you know, we have huge needs, in my opinion.

And then if we add on the transformative nature of what we're trying to do, that to me is just all the more reason that we probably need some big investments, because I think that it's going to be expensive to migrate over.

And so how do we do that? How do we keep our effectiveness in terms of a third of our economy is driven by this sector. So I don't think we necessarily want to, you know, do harm to that sector.

And so what I think we have to do is really get solution oriented and say, how can we get this done, and how can we get it done in a very cost-

effective way. Where does it make the win, win, win, win sense in terms of, you know, reducing the impacts from the emission and increase our competitiveness, improve our efficiency?

I think, you know, some of these things that we might do, we might solve one problem, but we create three others. So I think that's a big challenge for us, as well. But clearly, I think it was not without some significant investments.

CHAIRMAN WEISENMILLER: Yeah. I guess I'll start with you, but certainly encourage everyone to chime in on the next question, which is, you know, looking at the overall goods movement issue, and again, well, for now we can talk more about the L.A. Basin's questions, since you know, many of you are tied here.

But looking at everything that's on the table now, what are the -- what's the missing pieces that the POUs could or should help there on?

MR. CANNON: Well, could I just pick up on Fran -- this is Chris Cannon. Mr. Chairman, I just want to pick up on Fran's comment and just underscore it. Comprehensive goods movement planning and we have to do that.

The amounts of money and the industries that

are touched by the efforts that we're going to have to undertake over the next decade and more are huge, and the only way for us to do this and do it without wasting money or getting stranded assets or having people, you know, go down a path to then only decide that, oh well, we aren't going to go there, is to plan.

And so once again, appreciate your efforts today to have these kinds of discussions with the utilities, but the entire industry has to be part of this and it has to start immediately. And I just really want to make that point, because it's so very, very, very important.

And the points made by Earth Justice here, just as much, I mean, the stakeholders such as the justice communities and so forth have to be part of that discussion, as well.

MR. VAN AMBURG: I would just add a couple thoughts. I think we need to -- I definitely think we need to plan, and that's one of our key comments, so we can get a sense of what's coming, when it's coming, what we need to be ready for.

By the same token, I think we can do a lot from the utility level to walk before we run. I think we're at the stage now where we're -- most of

the applications that make the most sense for electrification are going to be in the medium-duty, return to base kind of fleet scenarios.

That can be delivery. That can be shuttle bus. Obviously, it's been in transit. That gives us a tremendous experience base over the next five plus years to really get the sense of how to get the infrastructure in, what is the cost, how can we standardize around some key installation designs.

So I think all of that will be really important. I think, you know, when I see -- for instance, I've talked to Marvin a lot because we're about to put an electrified cargo handler, top pick, at the Port of L.A., in a CEC-funded program, which is very cool.

That's a great learning experience because nobody's really done that before. So that's a great application to start giving us learning, but we'll get more volumes in the early stage around kind of these medium-duty, return to base, known routes patterns.

And by the time the really heavy stuff does start to come online we'll have gained this experience base. So I think to encourage the long-term planning, but then the short-term meddling to

make sure that we really start getting these things out, getting experience with it, really helping the customers knock down the barriers now, so we know what the bigger problems will be as we start to get into the heavier applications.

And I would just add one clarification to an earlier point I made. I talked about this three-year investment plan that the ARB's developing for heavy-duty. They actually have not yet set their workshop for that. It was hopefully going to be sometime in May.

MR. CANNON: If I may just add, that we've taken the approach -- the port keeps getting mentioned here -- we've taken the approach of developing or moving toward electrification based on the state of the technology of each of the pieces of equipment.

Some of the technologies for the equipment is moved further and some of it's a little bit behind. And so based on that we try to focus on areas we think we can have the best of impact, also based on areas that we think are going to be most utilized.

And the infrastructure to support those sort of prioritized areas I think are some quick wins.

You mentioned the top handlers. Top handler's probably the most versatile and used piece of equipment at a port.

It does all kinds of things, and if we can find a way to electrify those and find a way to have infrastructure to support it, there's a quick win. But it isn't easy. Just to give you an idea, the top picks that are being developed, the battery for one of them is one megawatt.

I've never even seen a battery that's one megawatt, but that just gives you an idea of the slow development of battery technology, that they have to build a battery that's that big and it's huge. It weighs many, many tons, thousands of tons, and so just to give you an idea of what we're talking about.

MR. VAN AMBURG: Well, Chris raises a good point and this is where the creative meddling gets in, because one of the other top picks will use a much smaller battery pack, but will opportunity charge throughout the day, kind of the way the Proterra buses have been operating on the road.

But that creates a different issue in terms of grid impacts and demand charges during the day. So we're at a really good point of this creative experimentation on those segments. And it is a great

segment, by the way, for targeting, because it's a huge user of fuel from a climate change perspective and from an emissions perspective.

MS. ADEYEYE: The one last thing I would add --

MS. INMAN: This is Fran -- oh, I'm sorry. Go ahead.

MS. ADEYEYE: One quick thing -- sorry, Fran. Just going off what yo both were saying, I think that there are gaps in enthusiasm about this. Like you both sound very enthusiastic, which is great, but I think that there is some reluctance and some fear around moving forward, and I think that it's important for all of the utilities to kind of follow as easily.

They said that one of their goals is to provide that market certainty, and I think that the other utilities need to be providing that certainty, showing that we really want to invest in this so that these technologies do kind of fall in line.

CHAIRMAN WEISENMILLER: Yeah. But again, I'm sort of -- probably all of you, including Fran, but obviously, you've got -- it's an L.A. community. Now, the good news is Edison's pushing hard, but it seems like at some point you have to have all the

pieces in place, you know; not just Edison, but LADWP, all the POU. You know, I mean, it's got to -- how do you get there? Yeah.

MR. VAN AMBURG: Well, it's a good point, Mr. Chairman, and I think -- and the L.A. Basin is one example. So you did have a couple of the utilities, Edison, but also on the private side, LADWP is really doing some very creative things right now, which I'm impressed with.

The ports are pushing ahead in their own way and then working with their tenants to see how to drive things faster with the Air District. But I think what we need is to start getting successes. Chris mentioned, you know, on the port side there's a couple of places that we could get successes.

I do think we need to get a good experience level with the technology where it succeeds and builds a good business case. People see it in operation. That builds the acceptance to take it into newer and additional applications.

It also frankly builds the supply chain so that you actually have the component manufacturers and the vehicle manufacturers able to then produce these vehicles at quality levels with competitive prices.

So we need to start building out the capability to provide these systems. And I think rolling it out in the right sequences so that we get these vehicles out there. We get experience. We start to build the volumes, and then it can extend into these additional marketplaces.

It's really going to be a critical part of the success for the utilities to learn as they go and to provide that assistance, as well as for the manufacturers and users to get some experience and comfort with the technology.

COMMISSIONER SCOTT: I was going to jump in here, as well. I think that there was a theme throughout both the first panel and your panel that we are potentially in a place where we might end up behind a little bit on the medium-duty and heavy-duty space, and this is obviously much broader than the IRP Guideline.

But I would be interested, and this is a big question to you, so maybe just a high level thought, and then if you have a chance to write more details down, but what thoughts do you have about how we can -- what actions do we need to take to catch up.

You know, and I think I heard Chris mention that we need a standardized plug. And Bill, you

mentioned that we've got to potentially start with medium-duty, return to base types of vehicles. And so you guys have, as we've been discussing, thrown out some ideas about how we kind of start taking action to bite off this bigger medium-duty, heavy-duty piece. But I think that's an important consideration for us, as well.

MR. VAN AMBURG: Yeah. And again, I would go back and -- Chris mentioned it, the planning -- I do think we need to have a visualization of where we need to go and get a handle on what can be these future demand areas, where will they be located.

This will really help the utilities, and I don't think they can or maybe should do it alone. And I think it should be part of the larger planning effort. I think the CEC would be the ideal agency to help either fund or lead that.

But I think we need to do that to understand a good sense of where the vehicles or equipment will start to roll out on what timing, what will be their load demands, and then we can start really understanding what the utilities need to be able to do on what timing and where to support that.

MR. CANNON: I would just add, one of the things that we found is that one of the biggest

limiting factors, especially for on road, zero emissions and our desire to move toward that, is the infrastructure to support the equipment.

So when you have an on road electric, heavy-duty truck, as I said, it's range is limited. But not only is its range limited, but there's very few places for it to plug in when it gets away from home. So you get the whole range anxiety thing.

And then if it breaks down, where do you take it? Do you got to drive it 100 miles back to its base or is there a place where you can have it repaired. So the effort to try and have the beginning at least of a network of infrastructure to support zero emissions, and I have to say near zero emissions, because those are going to have to play a role, least as transition technologies.

That would be great, and man, we need your help, because that's kind of what you guys are all about, is the Energy Commission is trying to figure out how to do that. And so that limits what you can do, and certainly, your help in that regard would be great.

MR. VAN AMBURG: And you have such a broad portfolio, and I think thinking about how to use it, both on the utilities space -- you were already

investing into the demonstration space -- we would certainly encourage this.

This isn't the platform for it here, but I think you should continue your investments into the medium and heavy-duty electrification demonstration area. I think range extended or hour extending technologies, which would be power packs that you can put on board, whether engine driven or fuel cell driven, to give additional range to heavier equipment, is a really big area of investment that I think would be powerful for the CEC to fund right now.

COMMISSIONER SCOTT: I think that's a good point. I would weigh in here that we have focused primarily on plug-ins, but there are lots of other -- near zero technologies, fuel cell technologies that we are also very mindful of.

The focus has been mostly on plug-ins, because that's what the utilities are looking at as part of this. But I want to make sure that people don't think we've forgotten the other technologies. Go ahead, Hannah.

MS. GOLDSMITH: Oh, yeah. I would repeat what Bill said as far as what's most important and what CalETC spends a majority of our time on is

incentive funding, whether that's the ARFVTP Program or GGRF or air quality funding, to get -- if yo go to a fleet and they have a very limited budget, especially with public fleets, if you're going to convince them to go from what they know and what their mechanics are trained to work on, to something brand new that requires different infrastructure, different mechanics, everything, or retraining, funding is absolutely essential to overcome both the mental and monetary barriers there.

MR. VAN AMBURG: I would say that, you know, you do have manufacturing dollars that you have used in the program. I think it might be good to broaden and create, maybe some of those dollars could support service centers, regional service centers for the vehicles. That could align with job training, which would be good.

And to Chris's point, it is true, we do need these companies to put more of these distributed service and parts centers around our regions to support the equipment when they get out there. And I think that would be another possible good use of Energy Commission funds.

COMMISSIONER SCOTT: Yeah. We do have a workforce training component to our program, as well,

that we can look at. Let me -- Fran was trying to say something a little bit ago. Fran, if you're still there and you'd like to say it, please jump in.

MS. INMAN: Well, I was just fascinated by the creative meddling concept, and I think for all of us to kind of put that hat on and think about, from what we do every day, and then also trying to understand what the other guy's trying to solve, that's where we really can find those solutions.

So I mean, success breeds success. So I'm really anxious for us to get some successes under our belts, and I do think that -- you know -- I keep describing it as an orchestra with no conductor and a lot of first violins, and we try to play music.

And I think with our energy partners involved that's even expanded. And so we have to really, I think, try to do that creative meddling and think about, you know, some of the discussions that I heard about the pricing and stuff.

I mean, if I'm wearing one hat, my solution to my problem might be the pricing, but it could be driving the adverse behavior from the other guy. So I think, you know, how do we get, do we call it balanced creative meddling or, you know, how do we open those dialogues so that we can really figure out

wherein the opportunities for the early success lie, because I don't know, a one megawatt battery, how you're going to haul that around.

(Laughter)

MR. CANNON: The only way it works is that a top handler has to have a lot of ballast in order to lift up a very heavy container, and so when you have a lot of ballast, fortunately, a heavy battery works for you. That's probably the only way you can do it there.

MS. INMAN: Okay. Bring on those big ships.

MS. RAITT: So it is getting late in the day. I don't know if you have more questions, Commissioners, or? Okay.

COMMISSIONER SCOTT: We could talk about this all day, but.

MS. RAITT: Yep. So if that -- if we can close this panel, I'd like to thank our panelists and our moderator, and we can move on to public comment.

CHAIRMAN WEISENMILLER: Yeah. Certainly, we encourage you to do written comments. We'd love to build off of what we have talked about this afternoon. And obviously, the more you can focus on the Guidance, that'd be great.

So going to public comment, we have one blue

card. San Diego Airport Parking. Please.

MS. McGHEE: Good afternoon. My name's Lisa. I am with San Diego Airport Parking Company, and we adopted SEV fleets in May of 2015. So I can actually speak from an end-user's perspective on the commercial side, and can echo so many things that I heard today in this meeting.

Our commercial vehicle volume population per ARB's 2017 Impact, the Class 2b is 51 percent, the Class 3 is 11 percent and the Class 4 through 7 is 22 percent, and the Class 8 is 17 percent. The most popular commercial vehicle is the 2b van at 51 percent, and it encompasses several vocations of shuttles, freight, para-transit, non-profits.

The inventory on the HVIP includes one 2b, hybrid van. The Class 3 has three choices. So and when you move into low NOx today there's no choices in the Class 2b and 3 van and shuttles. And I say that because that gives us an alternative to go back to fossil fuel vehicles.

Targeting the ZEV vehicle procurement process is really important, and that's what we do all day long in Transportation. We do know when we're going to procure and we do that based off of aging of our fleets.

And every fleet and sectors are different. The aging of the fleet's vehicles, light-duty, is averaging 11 years. Heavy-duty is anywhere from 12 to 20 years. Medium-duty, four to 12 years and FTA funded vehicles is a 12-year minimum.

Airport ground transportation operators is every two to five years. The vehicle miles traveled annually affects emissions and the savings opportunity. The light-duty is 12,000 miles, delivery trucks, 15,000, para-transit and refuge is 25,000.

The transit buses is 35,000. The Class 8 trucks is 70,000. Ground transportation airport shuttles is 50 to 80,000 miles per year. The population and volume of the number of vehicles does not translate into the same regarding emissions.

Light-duty is the most popular vehicle on average by 30 percent or more. However, the amount of fuel is 25 percent more by commercial vehicles and NOx is 80 percent more, and is per EMFAC's 2014 database on ARB.

Our fuel regulation standards have adopted efficiency standards for each vehicle mile traveled, but what is the standard or requirement for kilowatt hour. This affects commercial fleet operations as a

cost of a kilowatt hour, and the amount of kilowatt hours per mile influences the investment.

Modeling other resources such as renewables for charging infrastructure will affect fleets -- will attract fleets into SEV procurement, as this modeling equals a benefit. Transportation fleet operators are required to purchase thousands and millions of gallons of fuel annually.

When displaced with kilowatt hour it needs to be a benefit. Otherwise, the effects are the following: four cents more per mile on the following fleet sizes annually. A small fleet of six buses, like myself, would equal -- at four cents more would equal $12,000 more dollars per year annually for 240,000 annual miles; a fleet of 100 buses at $200,000 more per year for 5 million miles.

Renewable with solar and storage can be integrated to support the grid at peak time and lower the demand rates. Let's require commercial operators to charge at peak time with renewables. The light-duty and commercial Transportation Electrification is really black and white in every way.

It is very complex and that is the reason why we are behind with commercial electrification, due to the very vast differences. Our daily vehicle

miles traveled exceeds the vehicle range. The speed of charging requires the option of fast charging in order to top off during the day to stay on the road.

The amount of power, specifically three-phase, 480 volts, is not always available on the property. Demand kilowatt fees cannot be avoided due to both vehicle miles traveled and speed of charging. These barriers can be mitigated with more demonstration of advanced technologies incorporated with renewable charging.

However, the ZEV commercial vehicle inventory is too limited today to adequately even support the most popular commercial vehicle today, which is the 2b van. Chris has mentioned some of the regulation standards, and I will echo that largesse of experience than myself.

The EV manufacturing and vehicle technologies has great concerns.

MS. RAITT: Excuse me. I'll just say that we are out of time. If you --

MS. McGHEE: Okay.

MS. RAITT: We welcome written comments.

MS. McGHEE: Oh, I'm sorry. Okay. So again, my point would be is that we don't have any regulations for safety standards. There's no LBD

sharing. There's no durable life and useful standards.

These are components -- we need components that won't affect our defects in regulations. And to sum it up, the commercial vehicles are different than light-duty. We have no commercial lemon law in vehicles.

So we really do need to have more demonstrations to create more solutions to support the SEV commercial sector. Thank you.

MS. RAITT: Thanks.

CHAIRMAN WEISENMILLER: Thank you. Thanks for being here. McKinley Addy.

MR. ADDY: Thank you, Commissioners and Chairman. My name is McKinley Addy, and I'm with AdTRA, a virtual integrator of low carbon, high efficiency technologies at scale, relying on private capital and less on government incentives.

My comment address one area about the reliable operating data that relate to the certainty expected from medium and heavy-duty EVs with respect to the GHG and criteria reduction benefits. Data, data, data is one takeaway from the conversations today, as the IRP considers the POUs and their Transportation Electrification planning for GHG

reduction benefits.

To the extent that medium and heavy-duty EVs make up a portion of the POU GHG reduction strategy in California's overall transportation sector GHG reduction, there needs to be confidence around expected reductions.

One feedback that I'd like to provide here is that care and caution in the treatment of the GHG benefits of medium and heavy-duty EVs in the IRP, and perhaps more broadly, needs to be taken to account to avoid overstating benefits and disproportionate investment of scarce dollars for uncertain benefits.

And here are a few areas we found that can answer Commissioner Scott's question, what actions can be taken. One, to address these data needs we found that there's very little in the peer review technical literature on medium and heavy-duty EVs.

There's been much talk about the need to share data, and one way to do that is for a lot of the agencies or entities that have operational data to think about peer review publications. Giving some operation of BV transit buses and a few electric trucks, some have been funded by the Energy Commission, there needs to be we think a focus on getting some of that information out there through

the peer review publication process.

The availability of this type of data will help answer questions on reliable operation of time and utilization of medium and heavy-duty EVs. Another quick area that I'd like to point out is that when the medium and heavy-duty EVs that are out there phase down time because of a breakdown in equipment, sometimes the end-users have to replace these EVs with fossil fuel or diesel equivalents.

And a question that arises is, how is the -- or are the emissions associated with the replacement vehicles to be treated in balancing the benefits from the medium and heavy-duty vehicles? Successful implementation or successful performance of medium and heavy-duty EVs and the operating data availability are critical to TE, Transportation Electrification implementation success, and we'd encourage the Energy Commission to find ways to get some operating data out there from the millions of dollars that the Agency is spending. Thank you.

CHAIRMAN WEISENMILLER: Thank you. Thanks for being here. Matt Williams.

MR. WILLIAMS: Matt Williams, California Air Resources Board. First of all, thank you for hosting this Workshop. I think we got around to a lot of

interesting and pertinent topics. Right now, where we are in this process is still very high level.

So it's important that we figure out the scope of how the POUs will integrate TE into their IRPs. This is where we solve problems like the inclusion of hydrogen, which to the utility largely looks the same as charging electric -- battery electric vehicles.

The power drop is still there. One of the benefits of hydrogen is that it also is -- can be used as a storage mechanism for V2g. As an electrolyzer, using grid electricity can be generating hydrogen when there's excess solar on the grid and the vehicles aren't there, which you can't do with battery electric vehicle charging if the vehicles aren't at the depot.

So there's a lot of these high-level issues that we need to work out now. And in insuring that we continue to move in the right direction, when we start talking about what kind of programs the utilities can invest in, we need to make sure that we're looking at needs-based programs, and that needs to be defined in two ways.

The benefit needs, which is how we identify what needs to be targeted, where does the money need

to go. And those needs are prescribed by state goals, federal, local goals for petroleum reduction, air quality improvements, et cetera.

And then the program design needs to be based on the needs of the end-user. And it's critical that the utilities actually reach out to the end-users that will be using this program, be in touch with the fleets, figure out what their operations look like before they start designing programs.

Eric Seilo from Edison, can talk about this a lot. They worked hard to be in touch with their customers to understand what their fleets will need and to make sure that the programs that are designed will suit their needs and will be used.

All this insures the effectiveness of POU investments in Transportation Electrification and make sure that there will be uptake of the programs. Thank you.

CHAIRMAN WEISENMILLER: Thank you. Any other public comment, either in the room or on the line?

MS. RAITT: Well, we did get a few questions, and unfortunately, we're not really set up for Q and A, but I'll just read them for the record.

CHAIRMAN WEISENMILLER: Fine.

MS. RAITT: So first is from -- and I do not know how to pronounce his name. I'm sorry. Rajit Gadh, from UCLA, and his -- he had two questions. One was towards Tony Brazil's presentation. He said, "I may have missed the reason for this, but why is the cost per kilowatt hour different."

His second question is, "What is the thought of the panel regarding V2g with buses and trucks?" That was I believe the first panel. We also got two comments from Leslie Goodbody. The first one was, "Correction for Bill from SMUD on the Sacramento School Bus Project, 29 school buses at three districts. It is funded through the Greenhouse Gas Reduction Fund, which is part of the California Climate Investments funded through the Cap and Trade Auction Proceeds, not Prop 1a" -- "1b," excuse me.

And her second comment was, "Please note that the ARB Work Group that Bill Van Amburg of CALSTART mentioned for May 9th is postponed. A new date will be announced later." And I think -- okay. So that's what we had. I don't think anyone else on WebEx. So I think that closes the public comments.

CHAIRMAN WEISENMILLER: Actually, I was going to thank everyone. The one note I was going to

raise, you know, in terms of we have a lot of different things going on in the 350 context, and one of them is -- the good or bad news -- is that after for at least a decade we're finally looking at our data collections rates, also.

And as you might imagine, a lot has changed in energy space in that period of time, and so is more obviously looking at the data -- underlying data we need, some of which is transportation. We're doing that more in a phased approach.

So along with the Guidelines, is the data collection reform, and I think a lot of the transportation data parts looking forward will be more in Phase Two, which will really kick up next year. But anyway, just to help people get a sense of the overall roadmap.

COMMISSIONER SCOTT: So I just -- I wanted to say thank you to the folks who are left in the room. You guys gave us a lot to think about. I really appreciate our panelists spending their afternoon with us, bringing their best thoughts and their expertise to the Commission.

So thank you to all of our speakers today, and of course, I want to say thank you to Noel and Tim for organizing yet another thought-provoking and

interesting workshop. And of course, thank you to our IEPR team, who always runs a smooth and delightful workshop. So thank you all and with that I think we're adjourned for the day.

(Adjourned at 5:05 p.m.)

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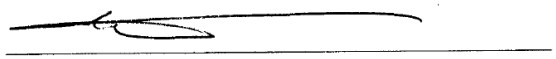

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