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CALIFORNIA ENERGY COMMISSION

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Preliminary Transportation  
Energy Demand Forecast

CALIFORNIA ENERGY COMMISSION

ROSENFELD HEARING ROOM - FIRST FLOOR

1516 NINTH STREET

SACRAMENTO, CALIFORNIA

TUESDAY, JUNE 20, 2017

10:00 A.M.

Reported by:

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Janea Scott, Commissioner

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AGENDA

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P R O C E E D I N G S

10:04 A.M.

SACRAMENTO, CALIFORNIA, TUESDAY, JUNE 20, 2017

MS. RAITT: Good morning and welcome to today's IEPR Workshop on the Preliminary Transportation Energy Demand Forecast.

I'm Heather Raitt. I'm the Program Manager for the IEPR. I'll quickly go over our 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 beware that our workshop today is being broadcast over our WebEx conferencing system, and is being recorded. We also will have a written transcript of today's meeting, and it will be available in about a month. And the WebEx will be available in about a week.

There will be an opportunity for public comment at the end of the day, and we're limiting comments to three minutes per person. If you'd like to make comments, please fill out a blue

1 card. And you can go ahead and give it to myself  
2 or to the Public Adviser in the back of the room.

3 For our WebEx participants, you can also  
4 comment at the end of the day. Just raise your  
5 hand to tell our coordinator that you'd like to  
6 make a comment and we'll open up your line at the  
7 end of the day at the appropriate time.

8 And materials for the meeting are  
9 available at the entrance to this hearing room,  
10 and available on our website. Written comments  
11 are welcome, and they're due on July 5th. And  
12 the notice gives all the information for  
13 submitting comments.

14 And with that, I'll turn it over to Chair  
15 Weisenmiller. Thank you.

16 CHAIR WEISENMILLER: Thank you.

17 First, I'll note, today is a Flex Alert.  
18 So I encourage people not to be wearing their  
19 sport jackets or suit jackets today. But anyway,  
20 whatever you're comfortable with. But it seems  
21 like it's a good idea in this context to, yeah,  
22 notch it down a little bit.

23 Again, I want to thank everyone for being  
24 here today and participating in the workshop. I  
25 think one of the core Energy Commission functions

1 is the Demand Forecast. And certainly, more and  
2 more we'll focus on transportation. That is 40  
3 percent of our -- roughly 40 percent of our  
4 state's greenhouse gas emissions. It's also  
5 about -- it was 80 of the air quality, the air  
6 pollutants. So in terms of trying to look  
7 through and figure out how our policies are  
8 effecting the transportation sector is becoming  
9 more and more important.

10 So anyway, thanks.

11 MS. RAITT: So our first presentation is  
12 from Siva Gunda from the California Energy  
13 Commission.

14 MR. GUNDA: Thank you, Heather.

15 Good morning, Chair Weisenmiller,  
16 Commissioner Scott. Thank you everyone for being  
17 here in person. And welcome all for those who  
18 have joined us through the webinar. So I'm Siva  
19 Gunda. I'm the Manager for the Demand Analysis  
20 Office in the Assessments Division, which is  
21 tasked with developing the Transportation  
22 Forecast.

23 So the Transportation Forecast Lead is  
24 Aniss Bahreinian. And she's supported by a staff  
25 of five that work in different areas of expertise

1 that's around aviation, light rail, fuel prices,  
2 the overall ZEV mandate, and so on. And the  
3 purpose of the forecast, the Transportation  
4 Forecast, is really to support the overall Demand  
5 Forecast of the Commission, so something that the  
6 DAO provides -- produces every year.

7           And as Chair Weisenmiller was just  
8 pointing out, the increasing electrification of  
9 vehicles is becoming an important aspect of the  
10 Transportation Forecast. And that is really  
11 helping us evolve this forecast into a more  
12 nuanced forecast that both addresses the overall  
13 Demand Forecast that is required by the DAO, but  
14 as well as give opportunities to really  
15 understand how the different policy and the  
16 regulatory mandates are really reflected in the  
17 forecast years.

18           So the purpose of the workshop today is  
19 really to present the preliminary results that  
20 the Transportation Forecast Team has come up with  
21 and solicit both the stakeholder feedback, as  
22 well as the guidance of the Commission  
23 leadership.

24           So as the Transportation Forecast  
25 continues to evolve, both from the decline of the



1 conventional fuels and fuel stock that we'll see  
2 in the marketplace, as well as rapid  
3 electrification, and an increase in the alternate  
4 fuel technologies, we have a real opportunity  
5 here to take into account all the outputs that we  
6 bring forth from our forecast.

7           Within the forecast, we do just -- we do  
8 not just do the overall demand of the fuels, we  
9 also, as a part of that, come up with the overall  
10 stock of the vehicles, the different classes, the  
11 population, the technologies that are in the  
12 marketplace over the forecast period, the VMT of  
13 these different vehicle classes, as well as the  
14 efficiency. So this gives us a lot of  
15 opportunity to really participate in the dialogue  
16 that makes the regulatory framework, as well as  
17 the mandates, the different mandates we have,  
18 really come to bear.

19           So a few things I want to start about.  
20 From a schedule standpoint, we have some  
21 important dates for those of you here in the  
22 audience, as well as joining us through the  
23 webinar. We have the public comments for this  
24 particular workshop on July 5th. And then the  
25 Transportation Energy Supply Workshop is on July

1 6th. So that workshop really focuses on the  
2 prices that we use for our forecast, those are  
3 the inputs. And for those of you who are really  
4 interested in the price assumptions and the  
5 inputs that we use, as well, both for  
6 conventional fuels, as well as for electricity,  
7 that's an important workshop to attend.

8           That's followed by August 4th when we  
9 have the Electricity Demand Forecast. This is  
10 the overall California Energy Demand Forecast.  
11 For those of you interested in that, that's an  
12 important date to remember.

13           In September on the 20th, we have the  
14 Natural Gas Outlook Workshop for those of you  
15 focused on natural gas. And we follow that with  
16 the revised Transportation Forecast at the end of  
17 November, and that is followed by a Staff report  
18 that details the overall inputs, assumptions, the  
19 modeling, as well as the Device Forecast results.

20           Typically in every year when we did this  
21 forecast, we kind of laid it out as inputs,  
22 assumptions and the results, because we were  
23 really focused on just putting out the numbers  
24 that the overall transportation -- the overall  
25 California Demand Forecast need for the

1 transportation sector. But this year, both based  
2 on guidance from the leadership, as well as other  
3 divisions who rely on that information, we tried  
4 to structure the presentation as key takeaways  
5 from what we've gotten from early results.

6           So the first one really caters to the  
7 overall Demand Forecast, so that's something that  
8 Jesse Gage is going to talk about. But when we  
9 look at the overall Fuel Demand Forecast for  
10 California, the one lesson we really see is a  
11 declining trend for gasoline demand.

12           That's followed by Mark Palmere. He's  
13 going to cover the vehicle stock, which is one of  
14 the outputs we get in our modeling. And there's  
15 a real increasing trend in the alternate fuel  
16 vehicle technology. So that's an important  
17 takeaway from the early forecast results we have.

18           And the last thing really talks to the  
19 electrification that we talked about. So this is  
20 something that -- so Sudhakar Konala is going to  
21 cover, which will talk to the trends we see in  
22 the overall electrification of vehicles and how  
23 that compares to the ZEV mandate.

24           Before I kind of hand over to Jesse, I  
25 just want to have your attention on this one

1 slide. So the Transportation Forecast is a  
2 pretty complex model that is used. It's actually  
3 a number of different models that the  
4 Transportation Team puts together. It's divided  
5 into multiple subsectors. But we use a mixture  
6 of econometric, as well as behavior models, to  
7 forecast.

8           So as you see to the left, all the way to  
9 the left, the first box of the inputs is the  
10 economic demographic data. That is really stage  
11 one of the forecast. The first stage of the  
12 forecast is to really understand the vehicle  
13 population over the forecast period.

14           The next stage of the forecast is really  
15 looking at the overall forecast and then  
16 segmenting that into different classes of  
17 technologies and vehicles. So that is done  
18 through a combination of what you see towards the  
19 right end, which is the vehicle attributes, and  
20 the box which says "2016 California Vehicle  
21 Survey."

22           So the vehicle attributes is basically an  
23 understanding or a forecast of how the different  
24 attributes of the vehicles are going to play out  
25 in the marketplace. That could include the price

1 of the vehicles, the range of the vehicles, the  
2 acceleration of the vehicles, and the different  
3 things that people care about.

4           So those vehicle attributes really are an  
5 implicit understanding of the marketplace and how  
6 the marketplace responds to the different  
7 regulations that are happening. So, for example,  
8 based on the café standards or the ZEV mandate,  
9 we expect that the manufacturers make certain  
10 adjustments to the vehicles to make sure those  
11 kind of regulations are taken into account. And  
12 those regulations then will affect the attributes  
13 of what we assume the vehicles will have, moving  
14 into the future. And based on those attributes,  
15 when we mix them with the consumer preferences of  
16 what they're looking for, we come up with what  
17 kind of fleet mixture we might have in terms of  
18 technologies in the marketplace.

19           So as you see all the way down, we really  
20 care about two things, or at least those are two  
21 important outputs for our model scale, one is the  
22 Transportation Energy Demand which is used by the  
23 overall California Demand Forecast, but the other  
24 one is the California vehicle population. And as  
25 I said earlier, the other key pieces are really

1 understanding the VMT by class and technology, as  
2 well as the deficiency.

3           So these various outputs that we generate  
4 through the process of the modeling really will  
5 give us an opportunity today and moving into the  
6 future to understand how the different  
7 regulations and mandates in the -- mandates are  
8 really affected the marketplace and the response  
9 in the marketplace.

10           So with that, I will pass it down to  
11 Jesse. Thank you.

12           MR. GAGE: Good morning everyone. I am  
13 Jesse Gage and I will be presenting the fuel  
14 demand portion of the Transportation Energy  
15 Demand Forecast.

16           A quick rundown of what I will be  
17 covering over the next nine slides. We'll start  
18 with a discussion of the transportation demand  
19 cases we will be considering. From there, I'll  
20 go over our fuel costs, which are obviously a  
21 core component of fuel demand. After that will  
22 come the preliminary Fuel Demand Forecast itself,  
23 including conventional fuels, alternative fuels,  
24 and wrapping up with a brief look at high-speed  
25 rail.

1           It is important to keep in mind that  
2 while we are today focusing on the Transportation  
3 Energy Demand Forecast, it is but one component  
4 of the overall California Energy Demand Forecast.  
5 Our demand cases need to be consistent with that  
6 more general forecast, which is why our demand  
7 cases are called what they are, a mid-electricity  
8 demand case or mid case, bracketed by high and  
9 low electricity demand cases. The definition of  
10 these cases, of course, manifest in several of  
11 our variables, specifically income and  
12 population, or even more specifically, number of  
13 households, are kept higher in the high  
14 electricity demand case compared to the mid case.

15           In the low electricity demand case there  
16 was a separate forecast for income. But  
17 currently, household count for now is being kept  
18 the same as the mid case.

19           Fuel prices also vary in the three cases,  
20 and we'll take a look at those now.

21           When the previous IEPR Forecast was  
22 prepared two years ago, prices had been over \$100  
23 a barrel for just a few months prior. The 2015  
24 to 2017 prices turned out to be lower than almost  
25 all predictions, and moreover has spent the past

1 two years in the \$40.00 to \$50.00 doldrums. This  
2 has resulted in unexpectedly low gasoline and  
3 diesel prices.

4           As you can see, we have three very  
5 distinct cases for crude oil price, a high price  
6 case where the cost per barrel returns to what it  
7 was in the early part of the decade, a mid case  
8 which largely follows the trajectory of the past  
9 couple of years, and a low price case where the  
10 low prices of 2015 are the new normal.

11 Historical data is from the Energy Information  
12 Administration, while projections are courtesy of  
13 my colleague, Ysbrand Van der Werf, who can field  
14 questions if you have any.

15           Before we look at cost-per-mile  
16 projections of individual fuel technologies,  
17 let's discuss for a moment the major trends we've  
18 discovered in our analysis by sector. But before  
19 that, we should digress into a quick explanation  
20 of the broad classification of on-road vehicles,  
21 medium, medium-duty, et cetera.

22           By light-duty vehicle, this is what you  
23 likely have in your garage, a passenger car or a  
24 pickup truck. The upper limit of this is  
25 somewhere around a Ford F250 pickup truck. It's



1 limited to what we consider light duty. Medium-  
2 duty covers your box trucks, such as UPS, FedEx  
3 delivery trucks, or maybe one of those food  
4 trucks you might see outside on days when it's  
5 not 110 outside. Following that there are what  
6 we've termed medium-heavy duty, which may cover  
7 professional trucks, furniture delivery trucks,  
8 and the like. And then beyond that, you have the  
9 full on heavy-duty when you're talking about  
10 long-haul semis.

11           So back to fuel trends. In the light-  
12 duty vehicle realm, electricity is projected to  
13 have the lowest cost per mile, while hydrogen's  
14 cost decreases dramatically during the forecast  
15 period. Electricity is also the cheapest of the  
16 various fuel types for medium-heavy duty. For  
17 those medium-heavy duty trucks, electricity is  
18 seen as a less developed option. And any inroads  
19 there are probably in the much longer term. In  
20 its place are diesel-electric hybrids, with  
21 natural gas trucks still being a smidgen cheaper  
22 per mile than diesel.

23           First, please note going forward, I will  
24 be discussing strictly the mid case, as we don't  
25 have light-duty vehicle attributes for the other

1 two cases. We will be covering those more in  
2 depth during the revised forecast workshop in  
3 November.

4 With that out of the way, we have our  
5 cost-per-mile projections for light-duty  
6 vehicles. Two things to note here.

7 First, not all vehicle classes are  
8 projected to accommodate all fuels. For example,  
9 there is no word of anyone planning a fuel cell  
10 full-size van. Second, this is not a fleet-wide  
11 average, but the cost of fuel per mile driven for  
12 cars of a particular model year.

13 The hydrogen price scenarios are proposed  
14 by NREL and reflect the reduction and the costs  
15 of the hydrogen production. Electricity, which  
16 is almost uniformly flat on a cost-per-mile  
17 basis, is prepared by the Supply Analysis Office.  
18 Gasoline and diesel are based on EIA prices,  
19 while where rising fuel costs in the mid case  
20 outweigh efficiency improvements, leading to a  
21 gradual increase in cost per mile over time.

22 The story for medium-duty trucks has more  
23 or less been covered in the previous slides.  
24 Electricity is flat, as it is with light-duty,  
25 while other fuels follow more or less the same

1 trajectory as gasoline and diesel did for light-  
2 duty.

3           With larger trucks on the lower end of  
4 the heavy-duty realm, we see the same story with  
5 diesel-electric, natural gas and diesel, but you  
6 can see the cost of propane taking off. This is  
7 a consequence of a projected increase of propane  
8 experts driving up the fuel price.

9           That wraps up the cost-per-mile  
10 comparisons.

11           So let's move on to overall fuel demand,  
12 beginning with conventional fuels.

13           Let's start with gasoline, as it's still  
14 the heavy hitter and it's the only one on this  
15 chart with some real movement here.

16           As gasoline has been relatively cheap and  
17 California has more or less dug out of the Great  
18 Recession, gasoline consumption has seen an  
19 uptake over the past few years. Our preliminary  
20 forecast suggests that this trend will reverse  
21 course and begin a decline, with about a 2  
22 billion gallon reduction in annual consumption by  
23 2030, which is a rate similar to that which the  
24 EIA has forecasted in their more recent Annual  
25 Energy Outlook.

1           There are a number of factors  
2 contributing to this reduction, including, in no  
3 particular order, increased fuel efficiency,  
4 rising fuel costs in the mid case, and  
5 displacement of gasoline-powered vehicles by  
6 alternative-fuel vehicles.

7           In contrast to gasoline, diesel remains  
8 relatively flat, as increased freight demand is  
9 balanced by increased efficiency. Jet fuel  
10 tracks closely with diesel, as it generally does  
11 in California, although it should be noted that  
12 this close tracking is more of a coincidence than  
13 anything else.

14           Turning now to alternative fuels and  
15 moving top to bottom, the increase in natural gas  
16 is spearheaded by a take-up in heavy-duty tractor  
17 trailers. Electricity gets a push from a number  
18 of sources, including light-duty, battery and  
19 plug-in electric vehicles, as well as  
20 electrification projects, such as Caltrans. Note  
21 that I am excluding high-speed rail from this  
22 particular slide, and we will cover it separately  
23 in the next one.

24           E85, while never approaching the highs of  
25 natural gas or electricity, does see a rise from

1 consumers opting more to fuel their flex-fuel  
2 vehicles with ethanol.

3           Finally, increased hydrogen refueling  
4 station availability, lower prices for producing  
5 hydrogen and the rollout of a broader range of  
6 fuel-cell vehicles lead to that market beginning  
7 its journey.

8           A quick note here. If you have the older  
9 version of the slides that were posted in the  
10 docket, this one has changed significantly.

11           The California High-Speed Rail's 2016  
12 Business Plan detailed two distinct stages of  
13 HSR. The system is currently slated to open with  
14 the so-called Valley-to-Valley Line in 2025,  
15 shown here in Blue, connecting San Jose to a  
16 station just north of Bakersfield. This is  
17 followed in 2029 by an extension north to San  
18 Francisco and south to Anaheim, shown here in  
19 red. This forecast was received directly from  
20 the California High-Speed Rail Authority.

21           That wraps up my segments. If you have  
22 any questions, we can field them.

23           CHAIR WEISENMILLER: Yeah. The question  
24 I have is on high-speed rail. Obviously --

25           MR. GAGE: Yes.

1           CHAIR WEISENMILLER:  -- this is the high-  
2 speed rail piece.  There's other transportation  
3 efforts going on in California, and trying to see  
4 if we've captured those or, at least over time,  
5 we can build those in.

6           Obviously, one of the things that we just  
7 got was the Federal Government funding for the  
8 line from San Jose into San Francisco, switching  
9 that rail from diesel to electricity.  I'm not  
10 quite sure the timing of that, but that's  
11 started.

12           Los Angeles had a major ballot initiative  
13 passed last year to really continuing amping up  
14 the subway system down there.  I don't know if  
15 you've got the details on it, but I think it's  
16 like \$100 billion, or something just amazing, you  
17 know?

18           MR. GAGE:  Uh-huh.

19           CHAIR WEISENMILLER:  And at the same  
20 time, one of the aspects of the gasoline tax bill  
21 was, I think it's a diesel line going out to  
22 Merced.  That again, I think, is light rail.

23           So anyway, it would be good to think a  
24 little more comprehensively about some of the  
25 other transportation projects on the agenda.

1 MR. GAGE: We can do that, sir.

2 CHAIR WEISENMILLER: Thanks.

3 MR. GAGE: With no further questions,  
4 that wraps up my segment.

5 Now over to Mark Palmere for a look at  
6 the vehicle fleet.

7 MR. PALMERE: Thanks, Jesse.

8 Good morning, Commissioners,  
9 stakeholders, members of the public. And I also  
10 want to welcome Anna Wong, who is here from the  
11 Air Resources Board, who's also presenting today.  
12 So we thank her for taking the time to come over  
13 here. She'll be talking about ZEVs later.

14 So I'm Mark Palmere, Energy Analyst in  
15 the Transportation Energy Forecasting Unit.

16 So in addition to fuel, our models also  
17 forecast vehicle stock, or more simply, the  
18 number of vehicles on the road each year. Today,  
19 I will give a brief overview of the inputs our  
20 model uses and the outputs we take away from it,  
21 as well as highlighting some key takeaways.

22 So in order to forecast details about  
23 vehicle stock, before we can look at fuel types  
24 or first classes, we first must answer a  
25 relatively straightforward question: How many

1 vehicles will be on the road each year? We  
2 calculate overall stock as a function of economic  
3 and demographic data inputs, with personal stock  
4 influenced by population and per-capita income  
5 and commercial stock influenced by gross state  
6 product, which indicates economic activity.

7           So this chart here shows the growth of  
8 light-duty vehicle population. You'll remember  
9 from the last presentation, light-duty vehicles  
10 are basically vehicles under 10,000 pounds, or in  
11 more understandable terms, basically anything  
12 smaller than a UPS van. Here we see the stock  
13 forecast from the present up to 2030 in three  
14 cases, high, mid and low. Now you may notice  
15 that the mid and low cases forecast similar  
16 overall vehicle stock. This is because, although  
17 we have three cases, we use only two population  
18 forecasts, the Moody's Household Forecast for our  
19 high case, and the Department of Finance  
20 Household Forecast for our mid and low cases.  
21 However, there's still a value in having three  
22 cases, instead of two, which comes later when  
23 looking at fleet composition.

24           In addition to calculating vehicle stock,  
25 we also break down the population by fuel type



1 and class. Now you may recognize this flowchart  
2 from Siva's presentation. But let's actually  
3 take a closer look at what influences fleet  
4 composition, specifically the inputs circled  
5 here.

6           The forecast of future trends uses  
7 current vehicle trends in the form of -- current  
8 vehicle population breakdowns in the form of DMV  
9 data, as well as vehicle attributes and consumer  
10 preferences from the Vehicle Survey to come up  
11 with sector, class and fuel type distributions.  
12 We find, through the use of our Vehicle Survey,  
13 that attributes are a major factor in determining  
14 vehicle choice. In other words, while income and  
15 household trends predict the number of vehicles  
16 purchased, attributes and preferences determine  
17 the types of vehicles.

18           So the attributes here are weighted in  
19 our model by importance, as we have found that  
20 vehicle range and price are most important to the  
21 consumer, but factors such as fuel economy,  
22 acceleration, et cetera, are also considered.  
23 Once attributes are collected, including  
24 projections of future trends, the model weighs  
25 them based on importance, as determined through

1 consumer preferences.

2           So the other main input for vehicle  
3 choice, consumer preference, is determined by the  
4 results of the Energy Commission's California  
5 Vehicle Survey. This survey has been conducted  
6 periodically since the 1990s to reflect changing  
7 preferences of consumers. The Technical Lead for  
8 the survey is our unit's Aniss Bahreinian, who is  
9 here to answer any questions you may have about  
10 the survey.

11           In the survey, we ask both residential  
12 and commercial owners about their current  
13 vehicles, which current vehicles, which we call  
14 revealed preferences, as well as asking them to  
15 pick a hypothetical vehicle when given different  
16 choices, which we call the stated preferences.  
17 Using these data, we come up with parameter  
18 inputs for our model to reflect these  
19 preferences. And as previously mentioned,  
20 preferences change. And notable we found in this  
21 survey compared to the last one, which was  
22 conducted back in 2013, include in residential a  
23 higher preference for PEV incentives such as tax  
24 credits and rebates, but lower preferences for  
25 fuel economy and vehicle price. And in

1 commercial a continued high preference for price,  
2 but lower preference for fuel economy.

3

4           Taken together these inputs give us the  
5 composition of the vehicle stock on the road  
6 throughout the forecast. As with the fuel price  
7 slides, we'll be focusing on the mid case where,  
8 as you can see, gasoline is projected to remain  
9 the predominant technology throughout the  
10 forecast. However, a closer look at the top  
11 quintile of this chart shows significant  
12 alternative-fuel vehicle market penetration.  
13 Zero -- ZEV credit earning vehicles, which are  
14 electric-hydrogen fuel cell and plug-in hybrids  
15 go from making up just 0.6 percent of the vehicle  
16 population in 2015 to 6 percent in 2030, a  
17 tenfold increase.

18           COMMISSIONER SCOTT: I just want to weigh  
19 in here. I think that we -- and I've gotten some  
20 really detailed and excellent briefings from the  
21 team on the assumptions and the information that  
22 we've put together.

23           One of the things that we still need to  
24 do in this space is to understand studies, like  
25 Bloomberg's Forecast for where alternative-fuel

1 vehicles, like electric vehicles, can be. Think  
2 about some of the -- and I recognize that they  
3 are not regulations or anything like this -- but  
4 the policies and stated goals of, you know, the  
5 ZEV Alliance, for example, in 2050, they want to  
6 strive to have all vehicles sold be -- 100  
7 percent of the vehicles sold be vehicles with  
8 zero tailpipe population, and just put this a  
9 little bit into the context of some of the --  
10 what some of the other studies are showing in  
11 this space.

12 CHAIR WEISENMILLER: Yeah, that would be  
13 good. I guess we want to make sure we got  
14 docketed the Bloomberg, you know, the National  
15 Academy study, and some of the other studies. So  
16 I'd like to get those in the docket for this.

17 I think the other thing that, you know,  
18 having just spent some time in China, obviously,  
19 with the Governor and Mary Nichols, I can say  
20 that there's a real push now. One of the things  
21 that came out of SAM (phonetic) was basically for  
22 a 30 percent target for ZEV in 2030, and that's  
23 worldwide. And China, actually, right now has  
24 like a million -- actually, it's hard to figure  
25 out Chinese statistics, but anyway, like a

1 million ZEVs at this point. But, I mean, we're  
2 talking to some cities that are talking thousands  
3 of buses, all their patrol cars, you know,  
4 thousands of taxis in a matter of a year or two.

5           So again, things are moving really fast  
6 there which, of course, I'd say for the Governor  
7 and Mary and I, our vision is that we really  
8 drive down cost, you know, as that goes forward.  
9 So that's -- but I think starting to get some of  
10 that here is important.

11           I guess the other thing just to probe a  
12 little bit on is, obviously, we have a model  
13 which looks at flows and stocks. And so one of  
14 the questions is that how fast does the stock  
15 change over? And, you know, I think my  
16 impression was that the average life of cars in  
17 California is at least 12 years, you know, what  
18 we're seeing now in our study. But, you know,  
19 that's part of the inertia on the transformation.  
20 And, you know, obviously at this point the Air  
21 Board is doing a lot to -- obviously, the older  
22 cars are the dirtier cars, right -- so a lot on  
23 trying to move out the older vehicles. But as  
24 the technology changes and opens up, you still  
25 have the question of how fast does the existing

1 stock change over? And that's going to be  
2 important to understand that and policy tools  
3 that might affect the stock.

4 Do you have a sense of, you know, what  
5 the mean or average life of our fleet is at this  
6 stage?

7 MR. GAGE: This is Jesse Gage again. I  
8 have taken a look at the DMV database.

9 CHAIR WEISENMILLER: Uh-huh.

10 MR. GAGE: I take a look at that every  
11 six months. We get a data dump of that.

12 CHAIR WEISENMILLER: Right.

13 MR. GAGE: And your intuition is correct,  
14 it's about a 12-year turnover for vehicles at  
15 this point.

16 MR. PALMERE: And just to add, the idea  
17 of vehicle stock turnover, we also, next -- or  
18 the next slides are going to be about new vehicle  
19 sales, so that sort of shows more stronger trend,  
20 because sales are going up, but this represents  
21 the less -- the time that it does take to turn  
22 over, because there's still going to be old cars  
23 on the road for, like Jesse said, about 12 years  
24 on average.

25 So, yeah, actually, yeah, those are the

1 next slides.

2           So we do see similar increases in new  
3 vehicle sales as the ZEV-earning vehicles -- ZEV  
4 credit-earning vehicles are forecast to make up  
5 almost ten percent of vehicle sales in 2030. The  
6 ZEV forecasts will actually be discussed in much  
7 greater detail in the context of complying with  
8 ARB ZEV Regulations in the next two presentations  
9 by Anna Wong and Sudhakar Konala.

10           But one other type -- one other fuel type  
11 I would like to expand upon now is diesel, due to  
12 its recent fluctuations. And this is just a  
13 closer look at the top portion of the vehicle  
14 sales share chart.

15           So we did see a major drop from 2015 to  
16 2016 in light-duty diesel sales. However, this  
17 trend is not forecast to continue. After the VW  
18 scandal, as well as difficulty in meeting  
19 emission standards, manufacturers shifted away  
20 from diesel cars, and as a result, many such  
21 models were discontinued and diesel car sales  
22 dropped almost 90 percent in just one year to a  
23 bit over 1,000. But the main source of light-  
24 duty diesel sales continues to be pickup trucks.  
25 Sales actually rose over 30 percent in 2016. And

1 with light truck sales continuing to rise due to  
2 increased preferences for size, we expect them to  
3 more than compensate for any further decreases in  
4 car sales.

5           With these data, we can now calculate  
6 fleet-wide fuel economy. Now if you'll remember,  
7 fuel economy was mentioned as an input earlier,  
8 but that is just fuel economy by fuel type and  
9 class. This is fuel economy among all vehicles,  
10 which uses the composition of vehicle population  
11 output to determine an overall average. In other  
12 words, the quantity of vehicles of each fuel type  
13 and class sold effects the overall fuel economy  
14 number.

15           We see that California has historically  
16 had an overall fuel economy higher than that of  
17 the United States as a whole, meaning its  
18 consumers purchased more fuel-efficient vehicles  
19 on average.

20           Here we see forecast fuel economy  
21 reaching approximately 35 to 37 mpg in California  
22 by 2030, depending on the case. And that is in  
23 line with the EIA's nationwide forecast of 30 to  
24 31 mpg at the same point in time, remembering  
25 that national fuel economy has historically been



1 a bit less.

2 My final slides show freight truck share  
3 by fuel -- freight truck sales share by fuel  
4 type. Bob McBride is the Lead Staff for our  
5 unit's forecasting, and he is here to answer any  
6 specific questions.

7 But to summarize the key points, we see a  
8 similar penetration of alternative fuel vehicles,  
9 vehicle sales, in the medium- and heavy-duty  
10 markets. Since diesel is the main fuel for  
11 freight, freight hybrids consist of diesel and  
12 electricity and are forecast to make up about  
13 one-third of medium-duty sales in 2030, with  
14 natural gas and full electric also making  
15 inroads.

16 Natural gas is the main alternative to  
17 diesel in the heavier trucks, as shown in this  
18 chart of new heavy-duty truck sales. As you see,  
19 it makes major inroads on the diesel market, as  
20 well as diesel-electric hybrid. But propane  
21 makes little impact, likely due to rising propane  
22 fuel costs, which we saw in the previous slides.

23 Now that we have looked at fuel types in  
24 aggregate, we will now narrow our focus to zero-  
25 emission vehicles, as they are an important facet

1 of the policy we study. But before that, if  
2 there are any more questions about this  
3 presentation?

4 COMMISSIONER SCOTT: I don't have any  
5 more questions.

6 CHAIR WEISENMILLER: Actually, we're  
7 going to have public comment at the end of the  
8 day. Yeah. Thank you.

9 MR. PALMERE: Okay. So up next is Anna  
10 Wong from the Air Resources Board with her  
11 presentation on the ZEV Regulation compliance  
12 scenarios in the Midterm Review. Thank you.

13 MS. WONG: Good morning everyone. My  
14 name is Anna Wong. I'm a staff Air Pollution  
15 Specialist for the California Air Resources  
16 Board, and thank you so much for having me be  
17 able to present these compliance scenarios.

18 The compliance scenarios have changed,  
19 obviously, significantly since they were first  
20 sort of presented in 2012. And so I'm going to  
21 talk about the process that we went through to  
22 change them for something we called the Midterm  
23 Review. And that was a bigger process that we  
24 looked at the standards that were adopted in  
25 2012, and we took a review of those standards

1 back to the Board earlier this year in March,  
2 down in Riverside. So all of those proceeding  
3 are online, and I invite you to check them out.  
4 It was a pretty exciting Board hearing, as Board  
5 hearings go. Okay.

6           So this should be a very familiar  
7 picture. I've shown it hundreds of times, I  
8 feel. But we created compliance scenarios that  
9 went along with the new rules that we adopted in  
10 2012. And the reason why those rules were so  
11 significant at that time was that this was the  
12 first time we ever increased the ZEV mandate.  
13 This was an increased annual requirement through  
14 2025 model year.

15           And the reason why we have to come out  
16 with compliance scenarios is, A, we have to model  
17 our costs whenever we do a rulemaking. And I  
18 have to show how my program, the ZEV Regulation,  
19 translates into vehicles. And that's a problem  
20 because my program is based on credits. And  
21 those credits are given to each vehicle based on  
22 its electric range. So this is complicated be  
23 you have to assume what kind of vehicles make up  
24 that new fleet coming in. And so what the ZEV  
25 Regulation does is it requires manufacturers to

1 produce a certain amount of credits each year,  
2 and that is based on their annual sales.

3           So we came up with this compliance  
4 scenario, we call it the 2012 Compliance  
5 Scenarios, but it's actually put out in 2011. We  
6 workshopped it as early as 2010. So these are  
7 quite old as far as scenarios go. And it  
8 projected about 1.4 million ZEVs on the road by  
9 2025 as a result of the regulation. And that's a  
10 mix of battery-electric vehicles, fuel-cell  
11 vehicles and plug-in hybrids. That results in  
12 about 15 percent of annual sales by 2025.

13           Now, obviously, things have changed, and  
14 they've changed rapidly since this program's  
15 adoption in 2012. So I'm going to go through  
16 some of the inputs that really affect these  
17 scenarios. So we'll start with what we had in  
18 2012, going into these scenarios.

19           I've listed a bunch of items here, and  
20 I'm not going to go into all of them because it  
21 would be very boring for all of you. And I've  
22 written a whole paper about you, and I invite you  
23 to read it. But the two things that really  
24 matter here are electric range and how quickly  
25 that electric range grows. And this will have a

1 significant impact on the number of vehicles that  
2 come out of these compliance scenarios, again,  
3 because each of those credits is given to a  
4 vehicle based on its range.

5           And all of the vehicles that were assumed  
6 in this scenario in 2012 were 100-mile BEVs. You  
7 had some fuel cells mixed in there. And then you  
8 had a lot of low-range-ish plug-in hybrids,  
9 probably closer to the original plug-in hybrid,  
10 Accord, that were -- that was out, like in  
11 2013/2014 for about a model year. So we're not  
12 seeing those type of vehicles anymore.

13           So that's just an interesting thing that  
14 we did not necessarily predict. So there was no  
15 growth in range, there was only going to be 100-  
16 mile BEVs, and they were going to be for forever,  
17 I guess. So that was, I would say, not the  
18 wisest assumption, based on what's now happened,  
19 so reality has hit.

20           If you look at this chart, this is 2012  
21 through 2017, and this is the number of credits  
22 that we require, that's what's in that blue area,  
23 that blue shaded area. But if I put on here the  
24 actual credits that were earned, you can see that  
25 manufacturers have been over-complying with the

1 regulation, and this typically happens all the  
2 time. The requirements kind of go up and the  
3 manufacturers are able to either over-meet those,  
4 or they're preparing for the future. It's hard  
5 to tell in this type of regulation.

6

7           And why did this happen? Well, we have  
8 manufacturers actually making vehicles for the  
9 first time since the history of this program. It  
10 was adopted in 1990 and you have 2011 hitting  
11 with the Bolt and with the Nissan Leaf, those are  
12 big deals within this industry, so that happened.

13           And then we have manufacturers announcing  
14 longer-range vehicles than we could ever imagine  
15 possible within the battery-electric vehicle  
16 range, and a huge uptake of Volt-like plug-in  
17 hybrids. And when I say that, those are really  
18 strong plug-in hybrids with long electric range.  
19 So this all happened and it really through the  
20 scenarios we developed kind of into a different  
21 arena. And we needed to really look at those  
22 when we looked at the Midterm Review and say,  
23 well, now how many vehicles are we going to get  
24 from the regulation?

25           There's also been this monumental support

1 for electrification. And I know that  
2 Commissioner Weisenmiller already talked about  
3 this, but there's a global support for  
4 electrification; it's not just California  
5 anymore, it's a lot of different countries  
6 pushing for these policies. And the  
7 manufacturers are responding. We're seeing huge  
8 announcements for 100 percent electrification by  
9 2050 by manufacturers. So again, this is a  
10 different trend that we had to quickly kind of  
11 match our client scenarios with.

12

13           So we developed new scenarios. And what  
14 we had is we had five more years of actual  
15 compliance and actual numbers. We also -- the  
16 CVRP Team does a great job of trying to predict  
17 the amount of rebates that they are able to give  
18 out. And so they have their own way of doing  
19 projections, and we wanted to make sure that  
20 those aligned as much as they could.

21           But in the scenarios that we modeled, we  
22 still did expect compliance. And what I mean is  
23 you saw in that earlier slide, we have usually  
24 kind of a lower requirement, but we see actual  
25 sales higher than that. So this is just saying

1 if everything failed, what would the regulation  
2 require us to do at the end of the day? How  
3 would it be a backstop? So that's what the 2018  
4 through 2025 numbers, all these numbers, that's  
5 what they represent is kind of the minimum number  
6 that we could say would be on the road if all  
7 else failed, if there was no rebates, if there  
8 was no nothing.

9 I have on here, "Section 177 States," I'm  
10 not going to talk about them today, but they are  
11 the states that have adopted California's  
12 regulations. And the tool that we developed also  
13 looks at those numbers. So if you are very  
14 interested in those ten other states, the numbers  
15 are on that calculator.

16 We used the information that we gathered  
17 during the Midterm Review. We met with almost  
18 every manufacturer. We talked about confidential  
19 information. We did not use any of that  
20 confidential information in these scenarios, but  
21 we did just go through some thought exercises of  
22 how they might comply, knowing the industry  
23 trends that we were seeing with those meetings.

24 We also used a growth rate with that  
25 range, which was a different approach than we did



1 before. You saw that zero percent growth rate.  
2 There was never going to be a better car than a  
3 100-mile BEV. But we are seeing that as the  
4 exact opposite of what is happening, so we  
5 allowed for a growth rate to be in there that can  
6 be played with, and we played with that in these  
7 three scenarios.

8           And then we also, just as a side note, we  
9 have -- we still have, obviously, fuel-cell  
10 vehicles within these scenarios. And though the  
11 AB 8 Survey results are confidential, we have  
12 confirmed that they are at least within -- in  
13 line with what we're seeing through those survey  
14 results and what have been publicly reported in  
15 aggregate.

16           This is just an explanation of the tool  
17 that we used. We call it ZEV calculator. It's  
18 posted up on this link online. I'm guessing that  
19 these presentations will be posted or have  
20 already been posted. But this is a little bit, I  
21 hope, friendlier version of the calculator, that  
22 if you would be interested, you could run your  
23 own scenarios. You can run three scenarios at a  
24 time. And we developed this to be a much more  
25 public-friendly, or at least stakeholder-holder

1 friendly, calculator to run these scenarios.

2           Along with this goes one of the  
3 attachments of our Midterm Review Report, which  
4 was quite lengthy, but Attachment A or Appendix A  
5 is our analysis of these things. And it will go  
6 into far much more detail than I'm going to go  
7 into today about every single assumption that we  
8 made going into these scenarios. Okay.

9           So one different approach that we did,  
10 and I explain a little bit more about this, we  
11 chose technology themes, instead of a lowest case  
12 to midrange case and a high case. And the reason  
13 why we did that is we're not into rulemaking.  
14 Rulemakings, you typically say how few vehicles  
15 are going to come out of this, how many could  
16 possibly come out of this, and you have to do  
17 kind of costs between those two and come up with  
18 a middle. This, we decided to take advantage of.  
19 Well, what about -- what do we see -- how do we  
20 see manufacturers comply when faced with  
21 different technology situations? So let me just  
22 read through these and hopefully they can make  
23 sense to everybody.

24           So in our midrange case, we kind of  
25 assume that there's continued advancement in ZEV

1 technology, like we are seeing now. And what  
2 that does is it allows some manufacturers, they  
3 do really, really well and they continue on  
4 building what they say that they're going to  
5 build. And they use the -- how do I describe  
6 this? They use the flexibilities in the  
7 regulation moderately. So when a manufacturer  
8 doesn't have a product, they tend to use their  
9 regulation credits significantly. They're buying  
10 from other manufacturers. They're diversifying  
11 their portfolio of credits. And they're spending  
12 those credits because they don't really have a  
13 the yet, or they're waiting for that technology  
14 to come out, or they're just one model year away,  
15 or whatever is happening. But they will use the  
16 regulation credits to sort of get through the  
17 day.

18           Then there's the people that have -- the  
19 manufacturers that have wild success so far in  
20 the regulation. And they have so many credits  
21 and they're not so dependent on the regulation.  
22 They just sort of comply. They want us to ignore  
23 them and they do their own thing. And in this  
24 midrange case, we sort of assumed that. We  
25 didn't assume huge gaming of the regulation, huge

1 use of the flexibilities, but that it would be  
2 moderate case.

3           In this next case, in the slow ZEV  
4 technology case, we decided, well, what about if  
5 there was some big delay in advancement? All of  
6 sudden, you know, you had a big PR nightmare  
7 around battery-electric vehicles, or something  
8 that really stopped things or had to really put  
9 things on hold, or maybe those 200-mile BEVs that  
10 were promised, or something terrible would  
11 happen. And so in that case, we kind of assumed  
12 everybody would rush to get as many credits as  
13 they could. They would use heavily the  
14 flexibilities allowed in the regulation. And  
15 they would not be making such -- the vehicles  
16 that they promised. They would be kind of going  
17 back to the bare minimum, making just the bare  
18 minimum.

19           And then in the high ZEV technology case  
20 is, well, in 2012 we assumed 100-mile BEVs, and  
21 now we're seeing 250-mile BEVs on the road five  
22 years later. Well, what about if that happens  
23 again? What about if we have 400-mile BEVs by,  
24 you know, two years from now? So this is a very  
25 aggressive case in which technology range is

1 going very quickly. It's building up. The  
2 manufacturers are very excited about this  
3 technology and they just go all in. And this  
4 case, again, we have very highly capable ZEVs and  
5 plug-in hybrids on the road, and that is the way  
6 that they comply. They are not really concerned  
7 with the regulatory mechanism that they're  
8 allowed. They just want to get the technology  
9 out there because that's what the public wants,  
10 and they're responding.

11           So that's the three different themes that  
12 we did for these three cases. And I'm going to  
13 present mostly on the midrange case because it's  
14 just one of the cases that I can talk about the  
15 most easily.

16           You can see, the cumulative results, and  
17 this is not -- we did not try to get such tightly  
18 grouped results, but results in over a million  
19 vehicles cumulatively from each of these  
20 scenarios. That does include about 350,000  
21 vehicles prior to 2018 model year that are on the  
22 road that either we're seeing now or have -- or  
23 were projected for 2017 model year. We don't  
24 have all the data for '16 and '17 model year yet.  
25 But I'm going to talk about the midrange case.

1           So again, this is continued advancement  
2 of the ZEV technology. And it's a balance of new  
3 sales of improved ZEV capability, but there's  
4 also moderate use of the flexibilities that are  
5 allowed. So you can see that on averages or  
6 label ranges, BEVs go from 150 miles label range  
7 to about 210 miles by model-year 2025. And you  
8 might say, well, I thought all BEVs were going to  
9 be 200 miles. Well, they might not be. We might  
10 still see 150-, 100-mile BEVs. We're not really  
11 sure what's going to happen there. And it will  
12 be -- we think it will probably be a mix.

13           And then these are sort of regulatory  
14 terms, but non US06 and US06 plug-in hybrids.  
15 Non US06 plug-in hybrid is something like a  
16 Fusion, it's a blended plug-in hybrid in which  
17 something like an acceleration of a freeway  
18 onramp, there might be some engine assistance in  
19 order to get you up there, so it's not a pure  
20 electric for a certain amount of time, though  
21 they do have that capability in range -- low  
22 speed situations. And then US06 plug-in hybrids  
23 are plug-in hybrids that deplete the battery and  
24 then the engine will come on, so like a Volt-like  
25 plug-in hybrid. So I just wanted to describe the

1 differences there. But we see both of them  
2 playing a big role in all of these compliance  
3 scenarios. Okay.

4           So these are the annual sales. You can  
5 see, those are the bars in the back. And we've  
6 stacked the technologies on top of one another.  
7 And then, again, we've just put that cumulative  
8 line on the chart, just for reference. This does  
9 not include the 350,000 vehicles prior to 2018  
10 model year.

11           So we get to about this -- I didn't put  
12 it on here, but it's about seven-and-a-half,  
13 eight percent of new vehicle sales by 2025,  
14 again, just as a result of the regulation, not of  
15 an actual forecast or anything that we're saying  
16 the actual market will do. It was just the  
17 backstop.

18           This is a little bit more into the weeds,  
19 but this is how the numbers change specifically.  
20 If you're really interested, we did use a  
21 different annual sales, and we had to use AEO  
22 annual sales, that's a U.S. sales number, and we  
23 used a California share of those sales. And we  
24 did that because we needed to do California  
25 sales, and we needed to do Section 177 State

1 sales, so I had to start with a U.S. number so  
2 that we could have comparative results from those  
3 numbers.

4           Then when you add in the regulatory  
5 flexibilities that were approved by the Board in  
6 2012, and the updated technology assumptions, and  
7 then for the first time we also used banked  
8 credits that the manufacturers had already earned  
9 or that we were assuming them to earn prior to  
10 2018. So you can see how we get from that 2012  
11 eyesore number, sorry, Initial Statement of  
12 Reasons number, the staff report number, down to  
13 the 2018 -- or 2017 midrange case that I've added  
14 on there, the 2010 through 2015 population, as  
15 well as the '16 through '17 estimate that we did  
16 for the Midterm Review.

17           This is sort of a summary of all of these  
18 things. You can compare all the different  
19 assumptions that were made in each of the cases.  
20 But this -- if you'd like to really study the  
21 numbers, you can look at all these things across  
22 the board. But again, the most significant  
23 change and the really -- the one thing that  
24 really had an effect on the numbers was the  
25 overall label range going up for all vehicles.



1 And so that really will bring the overall number  
2 down, because the more each vehicle earns, the  
3 less vehicles you can expect from the regulation.

4 And that's all I have. Do you have any  
5 questions?

6 CHAIR WEISENMILLER: Yeah, actually, a  
7 couple.

8 Commissioner Scott had mentioned earlier  
9 some of the outside studies, the National Academy  
10 or, you know, Bloomberg. I'm just trying to  
11 figure out how much you looked at those studies  
12 in what you're doing and what you found, the  
13 value in those, so which was best, which was  
14 worst type of thing.

15 MS. WONG: Often we use those types of  
16 studies. Because they're forecasts, we have to  
17 look at them in terms of did they consider the  
18 regulation when they looked at these scenarios?  
19 So we just want to compare the actual numbers.  
20 We also want to look at their range assumptions,  
21 obviously. And we often use them often for  
22 costs, just how are they costing out, batteries  
23 and things like that?

24 So -- and I'm not sure which NAS study  
25 that you're talking about, but like the Barrier

1 Study (phonetic), we found very interesting. And  
2 it came out right in the middle of this Midterm  
3 Review. And it confirmed a lot of our story  
4 around what the purpose of the regulation was  
5 versus the purpose of the broader market.

6 And so there are these barriers. And,  
7 you know, whether or not the regulation can solve  
8 all of them, you know, I think that we've seen  
9 that it can't solve every problem, but that we  
10 need a lot of different things acting at the same  
11 time in order to get over some of those barriers.  
12 So things like CVRP or infrastructure are  
13 incredibly important, if not just as important as  
14 things like, you know, the stick of the  
15 regulation in the background.

16 So I think that we see -- we do  
17 appreciate those studies and the work that comes  
18 out of them. And often we use them to kind of  
19 confirm what we were thinking or what we've been  
20 hearing from the manufacturers in order to  
21 develop these scenarios.

22 CHAIR WEISENMILLER: Well, I think in the  
23 recent Bloomberg Study, they point a lot to the  
24 research they've done on batteries to try to  
25 understand what's going on there in terms of cost

1 and range and how that really ties back to the  
2 ZEV side -- or BEV side of stuff. And again,  
3 just trying to see how much that fit into your  
4 thinking.

5 MS. WONG: Yeah. I think often it's  
6 helpful in confirming what we're hearing from the  
7 manufacturers. It's good to always have more  
8 data points than just them. And especially  
9 third-party research is really, really helpful.

10 CHAIR WEISENMILLER: I'm going to ask you  
11 a couple questions about other ARB programs, and  
12 there may be things you can't comment on or  
13 outside of your -- which is fine.

14 So, obviously, one of the other backdrops  
15 is land use planning, I guess SB 375, you know,  
16 in terms of looking at the pieces in the  
17 Transportation Forecast. One of the pieces is  
18 how much do people drive? And I know the Air  
19 Board has been trying to deal with some of the  
20 land use planning issues. Is there anything you  
21 can -- how are we taking that into account while  
22 thinking about our forecast here?

23 MS. WONG: Well, I think that -- I know  
24 that Aniss has been meeting with a lot of those  
25 folks over at our -- at the Air Board and has

1 been working with them on how they develop --  
2 they develop other types of tools, more bigger  
3 picture, looking at how do you meet 2050 and  
4 beyond goals. So I know that they've been  
5 considering that. I'm not directly involved, so  
6 I would not be a good authority. But I know that  
7 those. I've been a part of those meetings.

8 CHAIR WEISENMILLER: Okay. The other --  
9 the similar question is that given, from an air  
10 quality perspective, the older cars, A, the cars  
11 are a big deal, and B, older cars a key part of  
12 that. And so what's the Air Board doing to  
13 basically encourage the turnover in the fleet  
14 faster?

15 MS. WONG: There's a program called EFMP,  
16 the Enhanced Fleet Modernization Program. And  
17 then there's a PlusUp (phonetic) program which  
18 encourages lower -- it's focused on lower-income  
19 populations, giving, I don't know if you want to  
20 call them rebates, but bonuses to retire their  
21 vehicles and then get into either at least hybrid  
22 or something that is a little bit newer than  
23 their vehicle. And I know that they've been  
24 working with the different Air Districts to  
25 implement those programs. It's been active for

1 at least the past, I don't know, ten years or so  
2 to do that. And I know that in the last two or  
3 three years this focus on ZEVs has been  
4 incredibly influential in getting people into  
5 used ZEVs that are coming off the market, off  
6 these leases.

7 CHAIR WEISENMILLER: Right.

8 MS. WONG: Yeah.

9 CHAIR WEISENMILLER: Well, one of --  
10 looking at the forecast, we have a continual  
11 amount of diesel, you know, in the truck side.  
12 And we also have, you know, looking at the heavy-  
13 duty, et cetera, there's been some transformation  
14 but not a lot, particularly when you think about  
15 the L.A. Basin compliance.

16 So you want to talk for a minute about  
17 the sustainable freight strategy and how that  
18 might affect things? Or is, again, that outside  
19 of your --

20 MS. WONG: Definitely outside of my --

21 CHAIR WEISENMILLER: Okay. That's fair.

22 MS. WONG: -- comfort zone.

23 CHAIR WEISENMILLER: That's fair.

24 Thanks. Thanks. Again, as we go forward, I'd  
25 certainly want to encourage the staff to look at

1 is 375, the sort of rebate, or whatever system,  
2 on the older vehicles. And then also the  
3 sustainable freight strategy on how that might  
4 effect that piece of transportation.

5 Thanks.

6 Excuse me. Do you have anything?

7 COMMISSIONER SCOTT: Well, I do.

8 I just want to say thank you so much for  
9 being here. We really appreciate your  
10 partnership as we're putting this together. I  
11 think it's important in this space that the state  
12 is speaking with one voice, and that our  
13 assumptions are reflective of what you see  
14 happening with compliance with the ZEV mandate.  
15 So I really appreciate you walking us through  
16 this.

17 And one of the reasons I wanted to have  
18 this discussion now is because for those of us  
19 who kind of do this all day, every day, I think  
20 we are aware that with the range changes and some  
21 of the things that you highlighted in your  
22 program -- in your presentation, that the number  
23 of vehicles is a little bit -- is less than when  
24 we were talking about this before. But we wanted  
25 to make sure people really understood that and

1 where that was coming from. So I very much  
2 appreciate your presentation.

3           One thing I wanted to check on, and it  
4 may not be a question for you, it may be a  
5 question for me and you and the team offline a  
6 little bit, but it in your midrange case on slide  
7 ten, I think you mentioned that that would be  
8 about seven-and-a-half to eight percent of  
9 vehicle sales by 2025 due to the regulation. And  
10 then you described to us prior to that what that  
11 midrange looked at. And I think that in our  
12 slide we had, I think, five percent maybe of ZEVs  
13 in the 2030 time frame. So we need to do a  
14 little chewing up, I think, of that in  
15 understanding the difference.

16           CHAIR WEISENMILLER: Yeah. And I would  
17 note, the Scoping Plan has between 4 and 5  
18 million in 2030, I think it's 4.3 million, which  
19 is at the same time when we did the update  
20 pathway. So if anything, I would argue it should  
21 be higher.

22           COMMISSIONER SCOTT: Okay.

23           CHAIR WEISENMILLER: But the Air Board  
24 hasn't pushed it beyond that, so it's probably a  
25 reasonable assumption.

1           COMMISSIONER SCOTT: Well, we'll do so  
2 more work on there.

3           MR. PALMERE: Oh, sorry, if I could  
4 just -- this is Mark Palmere.

5           So our -- the six percent number was  
6 overall vehicle stock. So the new vehicle sales  
7 by 2025, they are over five percent of ZEVs.

8           CHAIR WEISENMILLER: Okay. Good.

9           MR. PALMERE: So, yeah, just if -- yeah,  
10 just looking at the similar numbers, yeah.

11          CHAIR WEISENMILLER: Yeah. No. That's  
12 good.

13          Also, the other question for you is just  
14 the split between a plug-in versus battery. My  
15 impression was that as the ZEV sales have grown  
16 the plug-ins have been relatively constant and  
17 the ZEV is sort of picking up some of that.

18          MS. WONG: So that was the truth through  
19 2016 model year. But, actually, this year, we've  
20 seen an increase in plug-in hybrids.

21          CHAIR WEISENMILLER: Okay.

22          MS. WONG: And that's probably with the  
23 release -- the re-release of the plug-in Prius  
24 Prime and the new Volt.

25



1 CHAIR WEISENMILLER: Yeah.

2 MS. WONG: And other things were  
3 happening where a lot of BEVs were kind of  
4 delayed. But we're seeing -- we almost -- the  
5 plug-in hybrid number right now is almost  
6 equivalent to what it was in 2016 right now. So  
7 it's been about 50-50 with the BEVs slightly  
8 above, only because there's just so many models  
9 of BEVs compared to plug-in hybrids. So it seems  
10 to always kind of be evening out to about 50-50,  
11 but we'll see. It's always an interesting  
12 question. These 200-mile BEVs have truly changed  
13 the game for all of us in the best way  
14 possible --

15 CHAIR WEISENMILLER: Well --

16 MS. WONG: -- in the best way possible.

17 CHAIR WEISENMILLER: -- and the other  
18 game changer is certainly China -- with China's  
19 insistence on BEVs, you know, that Toyota is  
20 getting back into BEVs because they have to sell  
21 in China, and that's the world's biggest car  
22 market.

23 MS. WONG: Uh-huh.

24 CHAIR WEISENMILLER: So, you know, and  
25 that's something which is sort of an amazing

1 shift for them --

2 MS. WONG: Uh-huh.

3 CHAIR WEISENMILLER: -- to go from plug-  
4 in only to, yeah, oh, now it's time to do BEVs --

5 MS. WONG: Uh-huh.

6 CHAIR WEISENMILLER: -- and fuel cells.

7 MS. WONG: Yes.

8 COMMISSIONER SCOTT: Thank you.

9 MS. RAITT: Thank you, Anna.

10 So next is Sudhakar Konala from the  
11 Energy Commission.

12 MR. KONALA: Hello everyone,  
13 Commissioners. My name is Sudhakar Konala. I'll  
14 be doing a brief analysis of ZEV Forecast today.  
15 And during any of the slides, if you have any  
16 questions, please feel free to ask me because it  
17 is a little bit technical.

18 So in this section I will be covering a  
19 couple of items, including vehicle attributes  
20 that are important in driving ZEV sales,  
21 specifically I'll be talking about BEV range and  
22 price. I'll also summarize how many vehicles we  
23 estimate will be on the road through our forecast  
24 period. And I'll describe how we verified that  
25 our forecast projects compliance with

1 California's ZEV Regulation.

2           So the first slide I have here is about  
3 the range of battery-electric vehicles, and we  
4 forecast it to grow over time. So this slide  
5 shows average BEV range for different vehicle  
6 classes as we classify them, as the Energy  
7 Commission classifies them. And although range  
8 is forecasted to grow, there are two specific  
9 trends that I'd like to point out.

10           First is through 2020 the growth in BEV  
11 range is pretty fast. This reflects projections  
12 that we made based on announcements of new models  
13 made by manufacturers, as well as those reported  
14 by the media. And it represents a push by  
15 manufacturers to introduce vehicles with 200-mile  
16 range in the near term.

17           Beyond 2020, range is projected to grow,  
18 but at a slower rate. And essentially the  
19 assumptions that went into that is a more  
20 conservative approach to improvements in battery  
21 technology, and the assumption that manufacturers  
22 would shift more towards lowering vehicle costs,  
23 rather than expanding range rate while keeping  
24 vehicles more expensive.

25           So I have seven classes listed here and

1 the average range for each class. These are the  
2 specific inputs that are actually fed into the  
3 model. And the model then determines --  
4 incorporates preferences for battery-electric  
5 vehicles based on these range values, and we get  
6 the output values that I will be talking about in  
7 later slides.

8           One point I would like to make is the  
9 large swings in range, especially in the early  
10 years. These large swings, either up or down,  
11 are due to introduction of new models. So if you  
12 look at the light blue line, you can see that the  
13 average range for compact cars is going up from  
14 below 100 miles in 2016 to almost 200 miles in  
15 2017. This change reflects sales of the Chevy  
16 Bolt, which we classify as a compact car. You  
17 can see similar trends happening for midsize cars  
18 and small crossovers. So these reflect  
19 anticipated new model introductions, and the  
20 likelihood that these new vehicles will be well-  
21 selling vehicles.

22           If you do not have any more questions, I  
23 will move on to the next slide. Okay.

24           So the second slide, it's the same  
25 information as a previous slide, but stated in a

1 different way. The previous slide, they were  
2 actually the inputs that are fed into the model.  
3 Once we run the model, we get a projection of  
4 sales. I took those projections of sales and I  
5 created a sales-weighted average of all battery-  
6 electric vehicles sold for each model year. So  
7 this is one number, and easily understood number  
8 that represents the average range of all battery-  
9 electric vehicles in that model year. So the  
10 solid green line reflects this value for all  
11 battery-electric. And you can see that in 2016,  
12 we project a value of about 150 miles, and it  
13 goes well beyond 200 miles by 2025, and it  
14 continues growing thereafter.

15           Also, because premium battery-electric  
16 vehicles make up a large portion of BEV sales  
17 today, I also made a rough calculation of what  
18 the average range of non-premium BEVs would be.  
19 And by non-premium, I'm essentially talking about  
20 all vehicles that are not Tesla's high-end  
21 vehicles. And you can see that there is an even  
22 higher growth in average range for non-premium  
23 BEVs, from below 100 miles in 2016 to also above  
24 200 by 2025.

25           One point I would like to point out is on

1 this chart I also placed assumptions about range  
2 made by the ARB in their Midterm Review. So this  
3 range shows the highest possible range in their  
4 high-tech scenario and their lowest assumptions  
5 on range in the low-tech scenario. The solid  
6 blue line represents their mid-technology  
7 assumptions on range. And you can see that both  
8 our overall BEV and non-premium BEV range all  
9 fall within the range that the ARB anticipated in  
10 their Midterm Review. And we actually -- our mid  
11 case slightly exceeds ARB's mid case, even  
12 through 2025.

13 Now moving on from range, I would like to  
14 talk about battery-electric vehicle prices. And  
15 the general trend here is we see battery-electric  
16 vehicle prices declining over time. But there  
17 are two sub trends that I'd like to point out  
18 that we expect to see in the market.

19 The first is through 2020, as  
20 manufacturers introduce better and longer range  
21 vehicles, we actually expect the battery-electric  
22 vehicle prices to rise. This is the nature of  
23 the game. If you want to introduce better  
24 vehicles, they're going to cost more to bring  
25 them to market, and this is what we anticipate.

1 But after a certain point, range becomes less of  
2 a factor. And we anticipate that manufacturers  
3 are going to concentrate more on lowering cost  
4 than expanding range at all costs.

5           So at this point, starting in 2020, we  
6 see the costs of battery-electric vehicles  
7 declining significantly over time, so that most  
8 of them are even lower than current prices.  
9 These declines in the cost of battery-electric  
10 vehicles squarely are correlated with the costs  
11 in -- sorry, decrease in costs of battery packs.  
12 And the prices of battery packs that I used for  
13 this, I got directly from what manufacturers have  
14 shared publicly through investor presentations  
15 and annual reports. So I looked at numbers  
16 published by automakers, like GM, Ford and Tesla,  
17 and I averaged those numbers to get an average  
18 number for the fleet, and I used those numbers to  
19 decrease the cost of better electric vehicles.

20           There was a study done by UBS Research,  
21 just about a month or two ago, where they looked  
22 at the battery cost of the Bolt. And they came  
23 up with a figure of \$31,500 for what they expect  
24 a Bolt to cost in 2025. I used the same  
25 methodology I used for our battery prices here,

1 and our value for the Bolt came out to be within  
2 a couple hundred dollars of what UBS stated. So  
3 I'm fairly confident that these numbers reflect  
4 what manufacturers choose to follow. Okay.

5           Moving on from prices and range, I just  
6 would like to make -- to talk more about how many  
7 vehicles we expect to be on the road. So on this  
8 chart we highlight how many vehicles we expect in  
9 all of our scenarios, both the low, the mid and  
10 the high. The low and the high just represent  
11 the shaded blue region, and the mid is a solid  
12 blue line. In this case, we expect about 715,000  
13 vehicles by 2020, approximately 1.4 million by  
14 2025, and over 2 million vehicles by 2030.

15           One thing I would like to highlight is  
16 that all three of our scenarios are above the  
17 values that ARB projects as needed through 2025  
18 in all three scenarios.

19           I would like to caution, though, that  
20 while I am presenting on road population, this is  
21 not a measure of compliance. I will talk about  
22 compliance in a couple of slides thereafter. But  
23 having an idea of how many vehicles on the road  
24 is helpful for all stakeholders.

25           Next, I would like to talk briefly about



1 our forecast for fuel-cell electric vehicles.

2           So by 2025, we anticipate that there will  
3 be between 175,000 and 240,000 vehicles on the  
4 road, with our mid case being about a 190,000  
5 vehicles. We compared our values with those  
6 presented by ARB in the 2016 ARB AB 8 report.  
7 And our projections are slightly above those from  
8 the AB 8 report.

9           So these fuel-cell vehicle numbers are a  
10 subcomponent of the total ZEVs that were  
11 presented in the previous slide. This slide also  
12 has battery-electric vehicles and plug-in  
13 hybrids, as was noted earlier.

14           Finally, after our forecast outputs total  
15 ZEV sales and stock on the road, the CEC's  
16 Transportation Demand Forecast assesses market  
17 demand for ZEVs and generates a forecast of  
18 sales. By converting this forecast of ZEV sales  
19 to ZEV credits, Staff can check the forecast  
20 results for compliance with ARB's ZEV  
21 Regulations.

22           So what we did was we took ARB's ZEV  
23 calculator and modified it so that our -- the  
24 output from our models could be input into the  
25 calculator. And we just run the calculator to

1 see if our forecasts were compliant in terms of  
2 credits. And what we found was that the forecast  
3 projects compliance in all three of our cases.

4 Now in the low case, compliance is close.  
5 In the mid case, in the high case, there is a  
6 good -- there is a reserve of banked credits  
7 that's maintained throughout. So this is  
8 something that we will further monitor as we go  
9 forward.

10 Finally, talking about -- one final topic  
11 I would like to talk about is how electric  
12 vehicle owners' preferences are in terms of  
13 charging.

14 This chart that you see here is a  
15 graphical depiction of the results obtained from  
16 the 2016 California Vehicle Survey about  
17 residential BEV owners. This chart has  
18 implications for grid operators, and it also  
19 presents an area for further exploration of study  
20 for the Energy Commission moving forward.

21 Here the chart has data collected from  
22 BEV owners. And we see that nearly 70 percent of  
23 residential BEV owners, as reported by the  
24 survey, plan to charge their vehicles at home and  
25 overnight. Now this does not come as surprising

1 news to anyone. Most people would expect that  
2 charging occurs at night and at home. But there  
3 are several interesting trends that we'd like to  
4 point out.

5           During the day most of the charging  
6 occurs at work and at public charging stations.  
7 And although this value is lower, we find that  
8 these stated preferences will be useful for grid  
9 operators as they continue to plan electricity  
10 demand going forward.

11           So this concludes my part of the  
12 presentation. If you have any questions, I would  
13 be happy to take them. Otherwise, I will turn  
14 the presentation back to Siva Gunda.

15           CHAIR WEISENMILLER: Okay. Just a  
16 couple.

17           MR. KONALA: Yeah.

18           CHAIR WEISENMILLER: I noticed in your  
19 fuel-cell presentation --

20           MR. KONALA: Yes.

21           CHAIR WEISENMILLER: -- yeah, I mean, it  
22 may be that being trained as a nuclear chemist, I  
23 tend to think of things in exponential growth.  
24 But, I mean, that's certainly the typical  
25 metaphor for new technology. And this certainly

1 is not an exponential scale, but is more of a  
2 conventional scale.

3           So part of it, I suggest that on the  
4 technology side, I know we've done some stuff,  
5 more in the Demand Office, on PV growth, rooftop,  
6 solar, which again is using models that reflect  
7 more of that diffusion of technology, which is  
8 somewhat, well, obviously more exponential in the  
9 early years, and then flattening over time, which  
10 is probably what you would anticipate here. The  
11 other thing to -- so in terms of long-term  
12 thinking, it would be good to bring in some of  
13 that technology adaptation-types of diffusion  
14 models.

15           The other thing is, like I said, the  
16 scoping plan does have -- 4.3, I believe, is the  
17 2030 number. So it would be good to look at the  
18 work papers for the scoping plan and try to  
19 understand, you know, what -- some of the  
20 differences. You sort of seem to be hitting  
21 things at 2025 consistently with the Air Board,  
22 but sort of not quite consistent in 2030.

23           MR. KONALA: Uh-huh. We will look into  
24 that.

25           CHAIR WEISENMILLER: Okay.

1           You?

2           COMMISSIONER SCOTT: I don't have any  
3 additional questions on this one.

4           CHAIR WEISENMILLER: All right.

5           MR. KONALA: With that, I turn back to  
6 Siva Gunda for his concluding remarks.

7           CHAIR WEISENMILLER: Thanks.

8           MR. KONALA: Thank you.

9           MR. GUNDA: Again, I'd just like to close  
10 off our segments with just highlighting some next  
11 steps for us.

12           So based on some of the inputs we are  
13 going to gather from both stakeholders and the  
14 comments that we received from the Commissioners,  
15 we're going to incorporate a lot of those  
16 feedback into our revisions for the revised  
17 forecast.

18           So important things to consider there is  
19 that as of today we do not have the vehicle  
20 attributes, for example, for the medium-duty  
21 vehicles, which we are still working with NREL.  
22 Those attributes are going to come later this  
23 summer, which are going to be incorporated into  
24 our revised forecast, as well.

25           Apart from that, we are also trying to

1 consider the time of use electricity for our  
2 forecast, so that's something that we haven't  
3 done in the past. But we are looking into how to  
4 adopt the time of use into our forecasts.

5           And finally, we'll be generating our  
6 revised forecast in the September time period and  
7 it will be ready for sharing that publicly in  
8 November.

9           And we really appreciate all your  
10 comments and feedback, which will help this get  
11 better.

12           So I also want to just close off with  
13 some thank you.

14           Anna, thank you so much for being here.  
15 Thank you, also, for going through  
16 (indiscernible) to kind of see and explore all  
17 the opportunities of collaboration.

18           I also want to thank the FTD, the Fuels  
19 Division. I'm still here -- I'm still new here.  
20 This is my first (indiscernible) and it's kind of  
21 a little nerve-wracking for me. But so we got a  
22 lot of help from FTD in terms of helping us with  
23 helping us getting the vehicle attributes through  
24 contracts with NREL.

25           Thank you to SAO (phonetic) for helping

1 us with the vehicle prices.

2 A special thanks to Charles Smith, who's  
3 here, who's helping us with the IEPR chapter.  
4 And Matt for really working with us in revising  
5 the presentation, as well as the content and the  
6 way we presented this in this public forum.

7 So you're inputs are really welcome. So  
8 thank you again. And I just want to show all the  
9 names of people who actually do the work. I'm  
10 just standing up here. So thank you.

11 CHAIR WEISENMILLER: No, thank you.

12 I think we're now at that stage for  
13 public comments or questions, I think.

14 MS. RAITT: Yeah.

15 CHAIR WEISENMILLER: We'll start with  
16 folks in the room.

17 I don't know, Public Adviser, have you  
18 gotten any blue cards? I know we have at least  
19 one gentleman who has a comment or a question,  
20 but have you gotten any blue cards?

21 Why don't you come up and identify  
22 yourself.

23 But anyone else who has a comment or  
24 question, if you could fill out a blue card, that  
25 would be good.

1           And as you start, you're going to need to  
2 identify yourself for the court reporter.

3           MR. COPE: Thank you Chairman. Brian  
4 Cope with Southern California Public Power  
5 Authority. I'm sorry I didn't fill out a blue  
6 card. I will before I leave.

7           When I started to sit, I was going to ask  
8 a question of Mark real quick. But in reality,  
9 the question or the answer isn't really  
10 important. I was kind of curious about the  
11 sample size of the survey that was done of the  
12 residential and commercial customers, and where  
13 it was.

14           But in summary, I guess I would go to  
15 support you and Commissioner Scott in your  
16 consideration of the other outside factors,  
17 besides just what Californians want. There's so  
18 much more to be considered, that I encourage  
19 Staff to add that to your considerations going  
20 forward. But I commend all of you here, Staff,  
21 for putting this together.

22           Thank you very much.

23           CHAIR WEISENMILLER: Well, I think the  
24 other area you might help us on is, as you know,  
25 there's a real science in designing polling



1 questions like this. And the question of, you  
2 know, how well these are set up, you know, I  
3 haven't dug into that. But I certainly encourage  
4 people to look at that and make sure the  
5 questions, in fact, aren't bias in a way that  
6 lead in different directions.

7 MR. COPE: I agree.

8 CHAIR WEISENMILLER: You know, obviously  
9 the people who -- ask the first Chair of the  
10 Energy Commission, Richard Mullen, that's his  
11 job, designing polling. And Richard is very  
12 sensitive to the way the questions are framed?

13 Anyone else in the room, questions or  
14 comments?

15 Please. You know, again, come on up.  
16 Yeah. Identify yourself. The court reporters  
17 going to need that.

18 MS. ADEE: Sorry for not filling out a  
19 blue card. McKinley Adee with ATRA.

20 Commissioners, I commend the staff for  
21 the initial work that they've done on this  
22 Transportation Energy Demand Forecast. Just a  
23 couple of questions on a couple of slides, number  
24 ten from the Energy Commission's presentation.  
25 They don't have to answer it now, but I just want

1 to sort of highlight some of this.

2           The cost-per-mile calculation for  
3 electric vehicles seems to be quite optimistic.  
4 That's light-duty vehicles. I would make the  
5 same observation for medium-duty vehicles on  
6 slide 11. And the reason for that is we've been  
7 part of a team that is doing some work for some  
8 of the utilities that are looking at SB 350-type  
9 demonstration projects. And we've spent some  
10 time taking some of the transportation  
11 electrification charging rates and converting  
12 them to cost-per-mile information. And we're  
13 seeing some different numbers.

14           One other observation on slide 16, the  
15 idea that BEV prices are doing to be declining  
16 over time, kind of wondering whether the staff  
17 considered the manufacturer cost losses that are  
18 reflected in some of the current vehicle pricing?  
19 So, for example, we know that GM and Nissan lose  
20 about \$8,000 to \$10,000 per Bolt or Leaf that's  
21 sold today. It will be of interest to know how  
22 the staff considered that kind of a loss in their  
23 future price projects.

24           I think I will end there.

25           CHAIR WEISENMILLER: Well, certainly, if

1 you could provide for the record any studies  
2 you've done on rate structure impacts on  
3 charging, that would be very interesting.

4 MS. ADEE: Yeah. That feeds very much  
5 into some of the adoption rates and again, as I  
6 mentioned, the cost-per-mile performance.

7 CHAIR WEISENMILLER: Well, in the --

8 MS. ADEE: Yeah.

9 CHAIR WEISENMILLER: -- Financial Times  
10 in the last month, their article on greening, you  
11 know, they have a chart that shows, in terms of  
12 gigafactories, and god knows how you define a  
13 gigafactory, but one in the U.S., one in Europe,  
14 and nine in China. So --

15 MS. ADEE: Yeah.

16 CHAIR WEISENMILLER: -- you know, the  
17 bottom line is the Chinese are really moving into  
18 batteries fast, and plan to really reduce cost  
19 fast. I think quality is another question, but  
20 we'll see.

21 MS. ADEE: Thank you.

22 CHAIR WEISENMILLER: Thanks.

23 Anyone else in the room?

24 Please come back up, Brian.

25 MR. COPE: Brian Cope with SCPA again.

1 I would suggest that the staff might want  
2 to look at a recent study that just came out from  
3 the Haas Institute in Berkeley about, basically,  
4 its pricing and elasticity of demand based on  
5 time-of-use rates. There's been quite a -- they  
6 did quite a study on really how people respond to  
7 time-of-use rates. And it's almost scary that  
8 they're really -- it's a very inelastic market.  
9 They're -- people are not moving as much demand  
10 off-peak as you would expect. So you might want  
11 to factor that into your consideration in the --

12 CHAIR WEISENMILLER: Yeah.

13 MR. COPE: -- for the Haas Institute.

14 CHAIR WEISENMILLER: Yeah. It's probably  
15 more generally for the Demand Forecast, although,  
16 certainly there's applicability here.

17 Anyone else? Anyone on the line?

18 MS. RAITT: Yes. Waiting to get the name  
19 real quick here.

20 And while we're waiting, I'll just add  
21 that the presentations are posted on the website,  
22 but we'll be updating the Energy Commission staff  
23 presentation for the latest version later today.  
24 Okay.

25 There is one question. "What percent of

1 the vehicle sales will be electricity by 2030 in  
2 California," and then it says, "by five percent?"  
3 I'm not sure what that means.

4 MR. PALMERE: Sorry. Mark Palmere.

5 Is this battery-electric only? Is that  
6 the --

7 CHAIR WEISENMILLER: For simplicity, why  
8 don't you give both. You know, just go to the  
9 chart and point to the, if you can, the battery  
10 and fuel-cell.

11 MR. PALMERE: So this is, yeah, this is a  
12 look at the top 20 -- the top of the graph. So  
13 we have electric. Electric is about five  
14 percent, hydrogen, one percent, and plug-in  
15 hybrid, about two percent, and this is in the mid  
16 case. And if the questioner would like, we can  
17 get the more precise numbers, the actual numbers.  
18 This is just the chart. But we do have the  
19 precise numbers available.

20 MS. RAITT: Thank you.

21 It looks like maybe we have one more. We  
22 can't open the line? Okay.

23 So we're waiting to see if we can open  
24 the line for the person to be able to ask their  
25 question.

1 MS. MCGHEE: Hello?

2 MS. RAITT: Yes. Go ahead.

3 MS. MCGHEE: Oh, okay. Good. This is  
4 Lisa from San Diego Airport Parking Company. And  
5 I did have a comment, just looking at vehicles  
6 and not only the cost per mile, but also the  
7 availability of vehicles.

8 Have you looked at what is the growth in  
9 terms of different vehicles that are available?  
10 Because it seems like when we look at electric  
11 vehicles, there seems to be a lot of higher end.  
12 When I look at the -- when I look at the Clean  
13 Vehicle Rebate Program or I look at the list of  
14 vehicles, I'm seeing ten Teslas and nine from the  
15 other makers. And it seems to be pretty much a  
16 duplicate from 2016 to 2017.

17 So I'm just trying to understand where  
18 some of this information is coming from in terms  
19 of what's going to be a future, input from other  
20 OEMs participating in other types of models of  
21 vehicles, besides just mostly the compact.  
22 Because at the mid review there was a couple of  
23 comments that were brought forth that we're not  
24 seeing any accelerated participation with OEMs in  
25 the trucks and the bigger vehicles. And also

1 that goes and applies for the medium-duty  
2 vehicles, as well. It's very fragmented right  
3 now. And I would like to hear some comments on  
4 that, as well.

5 MR. KONALA: This is Sudhakar Konala.

6 And I did look at the trends for light-  
7 duty vehicles. And for 2016, for example, I saw  
8 that Tesla made up about over 40 percent of BEV  
9 sales. So, yeah, we do factor in historical  
10 trends in terms of electric vehicles to see what  
11 kind of vehicles are selling.

12 MS. MCGHEE: And so have you noticed that  
13 there is a lack of participation when it comes to  
14 the SUV and the truck? And when we go into -- 50  
15 percent of all commercial vehicles are the  
16 Sprinter van, which is about an 8,500 to 10,000  
17 gross vehicle weight vehicle. And you've only  
18 got one electric vehicle in the entire country.

19 Have you guys had any forecast as to how  
20 we're going to help accelerate some of these  
21 other midsize, larger vehicles that are really  
22 kind of in betwixt light-duty and heavy-duty, but  
23 they are -- some are part of light duty and some  
24 are specifically medium-duty. But we really  
25 aren't seeing any progress in that area.

1           MR. KONALA: I can speak about light-duty  
2 vehicles. But for answers on heavy-duty, I'd  
3 have to defer to our lead on the freight, which  
4 is Bob McBride. I don't know if he wants --

5           COMMISSIONER SCOTT: Well, Sudhakar, let  
6 me jump in here.

7           So this is really a question, not about  
8 forecasting and how we've pulled together the  
9 numbers, but about -- I would put that more in  
10 our AB 8 Alternative and Renewable Fuel and  
11 Vehicle Technology Program where we are working  
12 to incentivize vehicles of all types. And that's  
13 something that we ought to think about with  
14 respect to that program, in that we are thinking  
15 about how do we put some incentives in the space  
16 to really get some more models or bring the cost  
17 down and things like that? So I'd put it more in  
18 that category than into the number of vehicles  
19 that you're using in your forecast.

20          MS. MCGHEE: Okay. Thank you.

21          COMMISSIONER SCOTT: Uh-huh.

22          CHAIR WEISENMILLER: Anyone else?

23          MS. RAITT: We have one more question  
24 that we're getting ready for.

25          CHAIR WEISENMILLER: Good.



1 MS. RAITT: Matteo, I think your line is  
2 open if you want to have your comment?

3 MR. MURATORI: Hello. This is Matteo  
4 Muratori from NREL.

5 I was wondering if, when projecting the  
6 cost per mile for the diesel vehicle types,  
7 you're including the actual cost, like the cost  
8 for building -- having it a fueling station or  
9 the EV chargers for electric vehicles?

10 MR. GAGE: This is Jesse Gage.

11 No. Infrastructure costs are not  
12 included in this. This is strictly looking at  
13 fuel efficiency versus fuel costs.

14 MR. MURATORI: Thank you for clarifying.

15 MS. RAITT: That's all the questions from  
16 WebEx.

17 CHAIR WEISENMILLER: Great. Well, I want  
18 to thank -- I wanted to, again, thank everyone  
19 for their participation today. This is certainly  
20 an important topic. I appreciate Staff's work on  
21 focusing on it and sort of working in a  
22 corroborative fashion with the ARB, as certainly  
23 this is -- you know, this whole area of ZEV is  
24 very important to California, you know? And I  
25 think trying to figure out what the appropriate

1 forecast is and how we can change the forecast to  
2 make it more aggressive is sort of what we're --  
3 change it in terms of policies, obviously, is  
4 what I'm trying to say, to actually achieve  
5 higher numbers, is where it's going to be a very  
6 important function.

7           It's also important that basically  
8 everyone has a chance to participate in programs.  
9 So along with our obvious focus on this sort of  
10 new purchase, and then trying to figure it out in  
11 terms of how to move from the city-used vehicles  
12 more out into the general fleet, so that all  
13 Californians can participate, will be important.

14           So again, thanks for being here. And I  
15 want to remind everyone, your comments, we're  
16 looking forward to those. I'm sure Heather will  
17 remind people of the date shortly.

18           MS. RAITT: July 5th.

19           COMMISSIONER SCOTT: Sure. And I would  
20 just echo the Chair's appreciation for the work  
21 that has gone into putting this together. We  
22 really appreciate it.

23           I'll underscore a couple of the things  
24 that we wanted to be sure to look at, and that  
25 was the scoping plan.

1           As we're looking in the 2030 time frame,  
2 we want to try to bring to bear, I think, the  
3 Bloomberg Study or ICCT Study, or other  
4 preeminent studies that are out there that kind  
5 of are talking about where they see the zero-  
6 emission vehicle, at least, market going, and  
7 seeing how we've got -- where those data points  
8 are compared to where our data points are, just  
9 for reference. I think those are things that a  
10 lot of people in this field follow and would be  
11 interested in seeing. We talked a little bit  
12 about NREL and making sure we get numbers from  
13 there.

14           And then, you know, I would make a call,  
15 I'm not sure how many people we have on the WebEx  
16 with us and here in the room, but for us to do  
17 some reaching out to the vehicle manufacturers,  
18 to other utilities, to the industrial gas  
19 providers, and some of the folks who can also  
20 help ground truth this.

21           And, Mark, you talked about this, and  
22 Sudhakar, as you look through what you see on the  
23 Board presentations and different things that the  
24 auto manufacturers and others have made note of,  
25 it would be great if we could get some of them to

1 weigh in and take a look at our specific  
2 information and weigh in on this, as well. So  
3 that's the other component that I would add.

4 But I appreciate very much the good work  
5 that's gone into this so far.

6 And that's all I have. Thank you.

7 CHAIR WEISENMILLER: So do you want to  
8 just repeat it?

9 MS. RAITT: Yes. Comments are due July  
10 5th. And all the information is in the notice  
11 for how to do it.

12 CHAIR WEISENMILLER: Thank you. So this  
13 meeting is adjourned.

14 (The workshop concluded at 11:38 a.m.)

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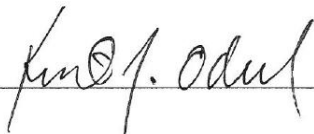
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IN WITNESS WHEREOF, I have hereunto set my hand this 2nd day of August, 2017.



A handwritten signature in cursive script, appearing to read "Kent Odell", is written over a horizontal line.

Kent Odell  
CER\*\*00548

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



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MARTHA L. NELSON, CERT\*\*367

August 2, 2017