CALIFORNIA ENERGY COMMISSION

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IEPR COMMISSIONER WORKSHOP ON PLANS FOR UPDATING

THE CALIFORNIA ENERGY DEMAND 2019-2030 FORECAST

REMOTE VIA ZOOM

SESSION 2: WEDNESDAY, AUGUST 26, 2020

2:00 P.M.

Reported by:

M. Nelson

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P R O C E E D I N G S

2:00 P.M.

WEDNESDAY, AUGUST 26, 2020

 MS. RAITT: All right. Well, let’s go ahead and get started then. So, welcome to today’s 2020 IEPR Update Commissioner Workshop on Plans for Updating the California Energy Demand 2019-2030 Forecast.

 I’m Heather Raitt, and I’m the Program Manager for the Integrated Energy Policy Report, or as we refer to it for short, the IEPR. Today’s workshop is being held remotely to encourage physical distancing to slow the spread of COVID-19.

 We’re holding this workshop in two sessions. This morning we discussed the economic and demographic scenarios, Electricity Rates and Self-Generation. And this is our second and final session this afternoon, and we will focus on EV, electric vehicle adoption and charging scenarios.

 And if you’d like to follow along and you’re on the phone, you can access the presentations from our website. They’ve been posted there. All our IEPR workshops are recorded, and we will have a recording and written transcripts on our website.

 This morning we will be using the Q&A function in Zoom, with the capacity to vote on questions posed by others. So attendees may type questions for panelists by clicking on that Q&A icon. And if you could check and see if there’s another question that has already been posed that’s similar to the one you wanted to ask, then you can just click on a thumbs up there and that will move it up on the queue.

 We are probably -- given the time restrictions, unlikely to elevate all questions received.

 There is going to be an opportunity for public comments at the end of the session, and if you’re using Zoom on-line, just click the raise-hand icon to let us know you’d like to make a comment.

 And if you’re on the phone, press star nine and that will raise your hand.

 Alternatively, written comments are always welcome, and they are due on September 16th. And the notice gives you all the information for how to submit written comments.

 And then with that, I’ll turn it over to Commissioner McAllister.

 VICE CHAIR SCOTT: Hi. Actually, this is Vice Chair Scott. I’m going to jump in and kick off the opening remarks. And then we’ll turn to see whether Commissioner Monahan or Douglas have anything that they’d like to say.

 I’m very much looking forward to this second part of the conversation. The plug-in electric vehicles and the demand that they will put on our grid is anticipated to grow. We’re also hoping very much that it will be done in a smart way, so that these vehicles are charging when demand is not so high, and also have an ability to put some power back to the grid, if and when the grid needs it.

 So I’m very much looking forward to understanding how that has changed since what we looked at last year, and hearing from our staff and team on that. So, just brief opening remarks.

 Let me turn to Commissioner Monahan or Commissioner Douglas to see if they’d like to say welcome as well.

 COMMISSIONER DOUGLAS: Hi. Nothing really to add here, but welcome, I’m looking forward to this afternoon’s workshop.

 COMMISSIONER MONAHAN: And me, too. I’m excited. I mean, it’s early days because we just -- the Air Resources Board just passed the advanced clean truck regulation that requires trucks to electrify. And by 2045 would require all trucks to be zero emission.

 And when I say electrify, I mean both fuel cell electric and battery electric options. And, you know, the forecast is really critical for helping make sure that we are aligning with the State goals, and that we are looking at various scenarios around, you know, meeting California’s aggressive goals, what’s realistic, and sort of what’s the least we can expect in terms of electricity impact.

 So, I think the State has a very strong commitment to cleaning up our transportation system, and to bending the curve on transportation pollution. So very much looking forward to hearing from the staff, learning, and having a great discussion. Thanks everybody.

 MS. RAITT: Great. So --

 VICE CHAIR SCOTT: All right. Thanks. With that Heather, we’ll turn it back over to you.

 MS. RAITT: Sure. Thank you.

 I’ll go ahead and introduce our first speaker. It’s Paul -- excuse me, Mark Palmere. Excuse me. Mark is a lead analyst for the light-duty vehicle forecast. And go ahead, Mark.

 MR. PALMERE: Good afternoon, Commissioners, stakeholders, members of the public and staff. My name is Mark Palmere, and I will be discussing our light-duty vehicle forecast updates. And I will be followed by Bob McBride, who will talk about the medium- and heavy-duty bus and freight forecast update. And then Heidi Javanbakht will discuss exploratory scenarios.

 Next slide, please.

 This slide presents the main updates to the 2019 IEPR Forecast. We have updated American Community Survey data, incentives, CAFE standards, baseline vehicle population, and large bus and truck vehicle retirement rate.

 Additionally, we are considering a disruption due to COVID-19, which we expect to show up in the economic and demographic forecasts, as well as fuel prices.

 Next slide, please.

 Let’s take a look at the light-duty vehicle forecast updates.

 Next slide, please.

 The 2020 IEPR Update will reflect changes in policy and the economy. We have updated the base year vehicle population numbers through the end of 2019 based on registration data from the Department of Motor Vehicles, or DMV.

 As was discussed in this morning’s session, economic and demographic data has been updated, and this applies to the transportation forecast as well, which incorporates number of households, income per household and gross state product, which are all economic and demographic variables. And these variables influence overall vehicle sales and population numbers.

 Incentives have been updated as well. Not only have we reduced them by $500 per vehicle based on the California Air Resources Board late 2019 announcement, we also intend to add an invest -- an additional investor-owned utility incentive funded by the Low Carbon Fuel Standard, LCFS, based on our discussions with the utilities.

 American Community Survey data have also been updated. These include household makeup distribution, vehicles per household and household income. And we also want to note our reflection of the federal rollback of the corporate average fuel economy, or CAFE standards, in our low case.

 At the same time, however, we do continue to follow CARB’s efforts to restore the standards in California, and are monitoring development, such as the recent agreement signed with five major auto manufacturers, binding them to increased fuel economy standards. And, finally, fuel prices will also be updated.

 Next slide, please.

 Of course, COVID-19 disruptions are also being considered. That is the big question that I’m guessing a lot of you are wondering about. For the Light-Duty Vehicle Forecast, or LDV Forecast, this will be reflected in the following ways. The updated economic and demographic forecast mentioned this morning, and in the previous slide, were developed with awareness of this disruption.

 Decreases in income and gross state product, especially, lead to a decrease in vehicle sales. And a decrease in vehicle sales can lead to both lower vehicle population and/or older vehicles on the road, which have a number of effects.

 Additionally, DMV registration data through June 2020 are being used to calibrate the forecast to what we are seeing in the actual market, up to the most recent quarter for which there is complete data.

 And the second quarter of 2020 was right in the middle of the pandemic, so we do feel like it will give us an idea of the market better than the first quarter, which was mostly business as usual.

 This will show us potential changes in vehicle population makeup. And finally, we will be tracking any long-term changes in vehicle miles traveled.

 Next slide, please.

 Finally, I’d like to once again show our scenario table. If you’ve attended any transportation workshop in the past, you’ve probably seen this before. But the red text here highlights changes we’re making in 2020, and some of them I’ve gone over already. State rebates have been decreased, but we have not finalized the investor-owned utility addition. And some high-occupancy vehicle lane access has also been extended, and that’s based on separate discussions with CARB staff.

 And finally, staff is reviewing manufacturers’ zero emission vehicle model announcements as part of an ongoing effort to forecast model availability and which classes have EVs available and when.

 Next slide, please.

 So, this concludes the light-duty portion of our updates. And I guess now we have time for questions from the Commissioners. Thank you everyone.

 VICE CHAIR SCOTT: I’m sorry. Okay. Great. Well, thank you so much, Mark. Appreciate the good presentation. I don’t have any questions quite yet, but let me see if Commissioner Monahan or Commissioner Douglas do.

 MR. PALMERE: Okay. Thanks. Thank you.

 COMMISSIONER MONAHAN: I don’t have any questions yet, but I do want to look more deeply at the scenarios. So I may have questions later, but not for now.

 MR. PALMERE: Okay. That sounds good. Thank you.

 MS. RAITT: All right. Go ahead. So this is Heather. I just wanted to say, it looks like we don’t have questions on Q&A, so we can just move on. Thank you so much, Mark, for that presentation.

 MR. PALMERE: Thank you.

 MS. RAITT: And we’ll move on to Bob McBride. Bob is the lead for the medium- and heavy-duty vehicle forecast.

 Go ahead, Bob.

 MR. MCBRIDE: Good afternoon, Commissioners, stakeholders, others interested in the forecast. I’ll present updates for the medium- and heavy-duty trucks, goods movement and buses.

 Next slide, please.

 We’re not changing our IEPR 2019 approach to forecasting buses and transit vehicles, but we’ll briefly review the high points here. We’re using the 2018 National Transit Database to quantify urban transit, including buses and other transit modes, like light rail.

 Forecasting the transit buses includes compliance with the CARB Innovate Clean Transit

Rule along three likely pathways of ZEV bus purchases. We also project ZEV school bus purchases, resulting from the Energy Commission’s School Bus Replacement Program.

 (Background colloquy)

 We’re projecting ZEV school bus purchases from the Energy Commission program. Airports are also required to move their entire fleet of shuttles to ZEV by 2035.

 Next slide, please.

 The COVID-19 virus is expected to impact the economy and human activity for years. This morning’s session described a variety of scenarios provided by Moody’s Analytics. The three scenarios chosen by the forecast team reflect a range of uncertainty that brackets likely outcomes. Given the many moving parts driving infections and restrictions on activities, for instance, we can expect the magnitude of tourism, accommodations and live events to recover slowly as the months through the early 2020’s unfold.

 Next slide, please.

 Most of these bullets are topics for my remaining slides, but here’s a capsule.

 Vehicle attributes and which fuel types appear in which truck classes is the same as for IEPR 2019. Truck retirement now follows the EMFAC2017 rates, Advanced Clean Trucks and the South Coast attainment scenario are topics for later slides.

 We’re preparing a special attainment scenario to determine the incentive levels required to meet the EPA Ozone Standards for 2031. Heidi Javanbakht’s presentation will provide a description of this work in a few minutes.

 Next slide, please.

 So here is our scenario table. I’ve updated the base of your truck incentives using an improved reckoning from CALSTART, who manages the hybrid and zero emission truck and bus voucher incentive program, which everybody likes to call, “HVIP.” That’s as of June 2020.

 This time we were able to represent stacked incentives, where utilities or local entities have incentivized trucks that also receive an HVIP voucher. HVIP maintains a wait list since applications in the last couple of years have exceeded the funding available in the fiscal year. However, for purposes of the truck choice model, we assume that HVIP vouchers are available for all comers.

 Our mid-case hydrogen price for dedicated fleets -- or our mid-case hydrogen price will resemble either the NREL commercial retail price used in the low case for other models, or the dedicated fleet price we’ve come up with using a right-sized fueling station in the high case. We’ll choose between retail and dedicated fleet hydrogen price for the mid case once we have some experience with this year’s model outputs. Battery prices and fuel economy for the three cases stay the same as in last year’s IEPR.

 The bottom row range should identify the typical battery-electric truck range as of 2031, but truly we’re using the 2030 values, since we don’t have updated attributes.

 We apply the battery-electric fuel type in truck choice sets for the four classes we have attributes, when the range of operations from the California VIUS [Vehicle Inventory and Use] survey can be covered by the expected range of the trucks. So these classes are split into two groups, one appropriate for battery-electric adoption, and the other with range requirements beyond that for current offerings.

 Next slide, please.

 The trucks are added to the vehicle for two reasons only, either they retire or there’s some economic growth.

 For this update we’ll use retirement rates implied by the truck turn over in EMFAC2017.

 The accounting for turn over due to year-to-year implementation of regulations is quite an undertaking. And 2023 is a key year in this process, since the pre-2010 trucks will no longer be registered.

 Importing newer vintage used trucks from other states is a legal way to comply with rules when earlier vintages disappear. But if our adoption rates don’t compare well to the advanced clean trucks’ percentage schedule, we’ll try to achieve the ACT percentage by reducing the number of used trucks allowed in the mid and high cases.

 Next slide, please.

 So the Advanced Clean Trucks reg was approved by ARB in June. 2024 is the first year with the credit percentage required starting in single digits. By 2035 the credit percentage requirements are as shown, from 40-percent for tractor-trailers, to 75-percent for straight trucks of Class 4 and up.

 We’ll compare the adoption rates predicted by the truck choice model to the ZEV and near-ZEV percentage schedule prescribed by Advanced Clean Trucks reg. Since we do not have price and fuel economy attributes for NZEV’s, these are plug-in hybrids that are yet to be commercialized, this comparison will be limited to ZEV percentages that we have attributes for.

 Some classes may exceed their target, while others may fall short. We plan a simplified post-process analysis of credit trading and the weight class modifiers to determine if the truck choice model ZEV shares will play out to achieve compliance overall.

 That concludes my part of the presentation. I thank you for participating in the workshop, and welcome any questions.

 VICE CHAIR SCOTT: All right. Thank you so much, Bob, for your excellent presentation as well. I do have a few questions for you, and I also have a few questions for Mark, that I’ve kind of wrote down and caught up.

 So, I’m wondering, maybe should we hear Heidi’s presentation, and then maybe the three Commissioners or four Commissioners can ask our questions all at the end.

 Or let me check with Commissioner Monahan or Commissioner Douglas. Would you like to ask Bob some questions right now?

 COMMISSIONER MONAHAN: I’m fine either way. It might make sense to go through all the presentations and then to cluster our questions, in case there’s more dialogue and cross-sectorial implications.

 VICE CHAIR SCOTT: Okay. So let’s do that. Let’s go on to Heidi’s presentation, please, and then the Commissioners will have a dialogue, Mark and Bob and Heidi, with all three of you, okay?

 MR. MCBRIDE: Okay.

 VICE CHAIR SCOTT: Awesome.

 MS. RAITT: All right. Sounds good. Thanks, Commissioner -- or Vice Chair Scott.

 So I’ll go ahead and introduce Heidi Javanbakht. Heidi oversees our -- the team responsible for developing the Transportation Energy Demand Forecast.

 So, go ahead, Heidi.

 MS. JAVANBAKHT: All right. Thanks, Heather.

 Good afternoon, Commissioners, stakeholders, members of the public. I am going to present on the Exploratory Scenarios that our team is working on for the 2020 IEPR.

 So, next slide.

 Sorry. My throat is a bit scratchy from all the smoke, but I’ve got water just in case.

 Okay. So, the exploratory scenarios are what-if scenarios that are developed in addition to and outside of the low, mid and high case forecasts. These scenarios are intended to estimate impacts of proposed programs or policies, or to explore other relevant questions that are just outside the scope of the adopted forecast.

 So for the 2020 IEPR, we have three areas where we are conducting exploratory work. Each of these areas was discussed in more detail during a Demand Analysis Working Group meeting that we held at the end of July, and slides from that meeting are posted on the CEC website, but I’ll go over each of these today at a higher level.

 So the first scenario looks at the impacts of the medium- and heavy-duty zero emission vehicle as options tables that would be needed to meet federal ozone standards for South Coast Air Quality Management District.

 The second scenario estimates the impacts of increased telecommuting levels post-COVID, and the third set of scenarios looks at best and worst-case electric vehicle charging load shape.

 So I’ll discuss each in more detail, starting with the South Coast scenario.

 Next slide, please. We’re on slide 16.

 Okay. For the South Coast Air Quality Management District -- sorry. One second. Okay. For the South Coast scenario, so South Coast will need a 55-percent reduction in NOx emissions in order for that region to meet Federal ozone standards in 2031. Transportation accounts for 80-percent of NOx emissions, and medium- and heavy-duty vehicles make up the majority of that. So, therefore, increasing numbers of zero emission medium- and heavy-duty vehicles is one strategy that South Coast is pursuing in order to meet the Federal ozone standard.

 The chart on the right is from a presentation that South Coast gave during the Demand Analysis Working Group meeting that I mentioned previously, that happened on July 22nd. And the key takeaway from this chart is that the high case from the 2019 IEPR, which is the red dashed line, falls far short of the adoption levels that South Coast would need in order to meet the ozone standard, represented by the dashed blue line.

 South Coast is projecting that they would need at least 80 thousand medium- and heavy-duty zero emission vehicles to meet that standard, which would be replacing conventionally fueled vehicles. So that’s a difference of about 30,000 ZEV’s, and it may actually be more than that, hence the need for separate scenarios to look at the impacts on fuel consumption.

 So, Bob McBride, who just presented, and Alex Lonsdale on the transportation forecasting team, are currently collaborating with South Coast AQMD and the Air Resources Board to develop the scenario’s underlying assumptions, including the makeup of ZEV’s, for example, the proportion of trucks that are fuel cell versus battery-electric. So since this scenario is still under development, I don’t have any preliminary results to show today.

 And we’ll move on to the next slide, and shift gears to the telecommuting scenario.

 So, Ysbrand van der Werf from the transportation forecasting team is leading this analysis. This scenario stems from COVID-19 and the likelihood that many office workers may continue working from home even after the pandemic, but at an increased level from before. So some may work from home full-time going forward, while others may go into the office two to three days per week, when before they were going in five days a week. So this scenario estimates the gasoline and greenhouse gas emission reductions, where increased levels of telecommuting continue after the pandemic.

 We used several sources of data to estimate these impacts. The workforce data comes from the 2018 American Community Survey, which comes from the U.S. Census Bureau. Commuting data are a combination of the American Community Survey data and the California Statewide Travel Demand Model, the CSTDM. The emission rates come from CARB’s EMFAC 2017 database, and the fuel efficiency is from our own staff analysis of DMV data for the makes and models that are on the road.

 We had to make a couple simplifying assumptions for this scenario. We limited the analysis to two sectors, which account for 22-percent of California’s workforce and 41-percent of California’s work-at-home force.

 The first sector we included was called, verbatim, Information, and Finance and Insurance, and Real Estate and Rental and Leasing. And the second sector is Professional, Scientific and Management, and Administrative and Waste Management Services.

 Now we recognize that not everyone who works in these sectors would be able to do their jobs from home. For example, a real estate agent would need to go out to show properties, however, there are likely some workers in the excluded sectors that would be able to work from home.

 A few examples of the sectors that we didn’t include were construction, retail or manufacturing sectors, where the majority of the work would happen on site.

 Lastly, we assumed that only single drivers provide savings, and we excluded those who take public transit or carpool. So we assumed that if one person begins telecommuting, that the public transit or carpool would continue without them.

 Next slide, which is slide 18.

 With those assumptions, that leaves 2.8 million commuters who drive alone, who are eligible to contribute to fuel and greenhouse gas emission reduction. The left chart shows the avoided gasoline consumption, and the chart on the right shows the avoided greenhouse gas emissions, both in green, for commuting either one day, three days or five days a week. The top of the gray bar represents fuel consumption or emissions for the 13.7 million commuters. So these percentages are out of the total number of commuters in the State.

 From these two sectors, if workers commuted one day a week, they would reduce gasoline consumption and greenhouse gas emissions by four-percent of the total from commuting, or 12-percent if telecommuting three days a week, and 21-percent if telecommuting five days a week.

 In comparison, all passenger vehicles consume roughly 14.5 billion gallons of gasoline, and emit 140,000,000 metric tons of CO2 equivalent per year. But working from home five days a week, just from these two sectors, would reduce passenger vehicle gasoline consumption and emissions by just under five-percent.

 Again, if you want more information on this scenario, there’s a much longer set of slides and more detailed set of slides available on the CEC website from our July 22nd Demand Analysis Working Group meeting.

 Next slide, please.

 All right. Last but not least, we are looking at several different EV charging load shape scenarios. And Alex Lonsdale from the Transportation Forecasting team is leading this portion of the exploratory analyses.

 These scenarios were requested by stakeholders and Commissioners who were interested in the grid impact best- and worst-case timing for EV charging. So, just to reiterate, this scenario is done outside of our adopted forecast, which relies on our EV infrastructure load model. So if you were in morning session, this EV infrastructure load model is one of the HELM models that Nick mentioned.

 So that model has developed a charging load shape that is dependent on time-of-use rates. Results from the 2019 IEPR mid case forecast, which are dependent on time-of-use rates, show that EV charging makes up about one-percent of the peak load, and that includes charging from light duty and medium- and heavy-duty vehicles, electric vehicles. However, these exploratory scenarios use charging load shapes that we develop outside of that time-of-use base model, and we are ignoring time-of-use rates.

 So, I also want to emphasize that these scenarios do not reflect what we observe or expect to see going forward, and this is particularly true for the worst-case scenario, where we are looking at the impact on the grid if all EV’s are charging during peak hours. We are also looking at a best case, where EV charging is managed with the goal of minimizing greenhouse gas emissions from electricity generation.

 And we’ve been testing out these charging profiles using 2019 IEPR results. So we -- I have a few preliminary results to show, but all of this will be updated once the 2020 Forecast results are available.

 Next slide, please. We are on slide 20.

 So, I’ll start with the best case. We are assuming that charging is managed in a way that reduces greenhouse gas emissions from electricity generation. And just one second. All right. Excuse me.

 Okay. This chart is a heat map, showing the hourly average greenhouse gas emission intensity factors in metric tonnes of CO2 equivalent per-megawatt hour for each month in 2030.

 Another office within our division develops these emission factors at the statewide level based on the generation mix required to meet the forecasted demand during each hour. So we’re summarizing here at the monthly level, but we are actually using an 8760 hourly profile of greenhouse gas emission intensity factors.

 So this chart shows that emissions are lowest during the hours in green, and highest during the hours in red. Note that the green hours correspond to when renewable generation is available. So the more favorable hours are midday -- excuse me. One approach to reducing grid greenhouse gas emissions would be to install more workplace charging, so that EV owners can charge midday and take advantage of the renewable generation.

 Next slide.

 All right. I’ve got just a few more slides to go, so, sorry for the coughing, but bear with me. Okay.

 So based on the 8760 hourly profile of greenhouse gas emission factors, we developed an EV charging profile. And this is an example of what it looks like for an average summer weekday, where the charging ramps up in the morning, peaks around noon, and begins to drop off around 2:00. For this scenario, we are not applying this load shape to all vehicle categories, we’re only applying it to categories where there is flexibility for charging to happen during these hours.

 So we are applying this to personal and commercial light-duty vehicles, except for the destination charging, and we’re applying this to all busses, except for transit busses, and applying this to neighborhood electric vehicles. We are not applying it to any medium- and heavy-duty vehicles, because those are usually on fixed schedules.

 So we acknowledge this doesn’t 100-percent apply for each category, but, again, had to make some simplifications. The categories that we are not applying this load shape to will instead use the TOU rate dependent load shape from the EV infrastructure load model.

 Next slide, please.

 The last scenario is worst-case charging scenario. And I again want to emphasize that we do not think this is realistic. This scenario assumes that all EV’s are charging at the same time. And this is just not very likely, given that time-of-use rates encourage EV owners to charge at night, –along with charger and vehicle technologies that allow users to set a timer to charge when rates are the lowest.

 Also, we are looking 10 years out, but we are ignoring vehicle to grid integration technologies, which by that time will be more mature and enable EV’s to also act as battery storage and provide power to a building or back to the grid, when needed, such as during peak hours.

 But all that being said, we developed two different worst-case charge profiles, and these are shown by the gray lines on both charts, and use the y axis on the right. So the gray line shows the percent of the daily consumption that is occurring during each hour.

 In both profiles we are assuming there is very little charging occurring during the off-peak hours, and that the majority of the charging is occurring during peak hours.

 These two profiles serve different purposes. Profile one assumes the charging happens over a shorter timeframe with a steeper ramp rate and a higher peak, while profile two assumes that charging is distributed over a longer timeframe and has a slower ramp rate.

 So profile two would be more representative of vehicles plugging in at different times using different types of chargers, for example, less fast charging and more Level 2 charging, or even Level 1, and charging for different lengths of time.

 We then tested these charging profiles by applying them to the 2030 California Energy Demand Hourly Forecast from the 2019 IEPR, and that’s what’s shown here in the two blue lines. The dark blue line on both of these charts is the hourly demand forecast for an average summer weekday in 2030 for the CAISO region.

 And we are showing the high-low scenario, which means this is a high demand case with low additional achievable energy efficiency.

 The dark blue line includes charging consumption for 4.3 million electric light-duty vehicles and just over 105,000 electric medium- and heavy-duty vehicles.

 So we then subtracted that out of the dark blue line, and then redistributed that consumption according to the gray charge profile.

 Okay. So we redistributed the charging based on the gray charge profile and added it back in to get the light blue line. So the total daily energy consumption for both the dark and light blue lines is the same, so that area under the curve is the same, but how it was distributed across the day is different.

 So these preliminary results show that when EV’s are charged based on time-of-use rate schedules, which is included in the dark blue line, that the summer weekday peak is forecasted to be around 40,000 megawatts. Moving all the charging to peak hours raises the peak to just over 50,000 megawatts for profile one and just under 50,000 megawatts for profile two.

 Again, these results are not final since they are using the 2019 IEPR results. We will update these with the results of the 2020 IEPR Forecast for year 2031.

 So that’s all that I’ve got. Thank you everyone. Thank you for bearing with me with my scratchy throat. And I will take any questions. I guess we’ve got questions for all three of us now.

 VICE CHAIR SCOTT: We do. Thank you so very much, Heidi. I appreciate your presentation as well, and surely understand all of us are struggling with the smoky air. So hope that that -- maybe some rain will come and help out our fire fighters and tamp that down a little bit for us.

 So, I have a few questions for you all, and maybe -- and it’s on a couple of the slides. And so maybe we can start by pulling up slide six from Mark’s presentation. And while we do that, Mark, that’s the one that has the series of assumptions that we’re making in the various scenarios about how many electric vehicles we anticipate coming.

 And the first question I have for you here will probably sound quite familiar to you. It’s the time-to-station question. And so, I’ve asked this a few times before. What the assumption it says here is that EV’s are the same as gasoline by 2022.

 One of the things that we talked about a few years ago when I was lead on transportation, which of course I’m not any longer, but is with the plug-in electric vehicles, a lot of times you don’t really have time to station, the same way that you do with a gasoline vehicle, right, because you have driven home and you just plug your car in once you get there, or you have driven to your office and you just plug your car in when you get there.

 And so if there’s not really a time to station, and I think we were going to work on trying to get a little bit more sophistication into that assumption when we’re looking through the attributes. And I’m wondering if we’ve had a chance to do that, or if we’re still kind of comparing that exactly to how long it takes to drive from your home or your office to a gasoline station?

 MR. PALMERE: Yeah. So that’s, that’s a really good question, and something we -- yeah, I do recall this being brought up, and, yes, it’s something we’ve been talking about for a while. I think that kind of the reason we’re leaning against just eliminating time to station for electric vehicles, although, as you said, it does -- it is -- to some people, it may seem like zero when they’re charging at home.

 If we did that, we wouldn’t really be reflecting the increase in charging -- in public charging availability, and I know that’s something that Fuel and Transportation Division is -- has spent a lot of time working on and providing funding for. And we just want to show kind of that it’s going to improve. Like for some, for people who never charge at home -- or, sorry, who only charge at home, it won’t be relevant. But for anyone who charges outside of home we’d kind of want to reflect the improvement.

 And -- but I do understand what you’re saying, because it is kind of -- like there are assumptions made, and in the end it doesn’t have that great of an effect, and it’s -- the way our model works, it kind of, it’s how it changes over time.

 So, showing like a positive time to station in what we call the base year, the first year of the forecast, and then it decreasing, is definitely a positive trend for EVs, and that’s kind of what we want to reflect. As opposed to if we assumed it to be zero starting now on the -- we wouldn’t show any improvement. And I don’t think that would really reflect the work that FTD and other private companies as well are doing in terms of making charging more available. But, yeah, I totally understand what you’re saying. It’s not -- there’s no like one simple answer to it.

 VICE CHAIR SCOTT: Yeah. No, okay. I appreciate that. And even my statement was an oversimplification of what happens with plug-in vehicles, right. Because you might not be always charging at home or always charging at work, you may be opportunity charging at your Target or your grocery store, or you may be fast charging, right, on your way someplace, or if you don’t have the -- a charger at your home or at your work, you may be fast charging as your fueling source.

 And, also, and with hydrogen, right, and the drive to hydrogen stations may look very similar to the drive to a gasoline station, right, and that’s an important metric to measure in this space as well. So I recognize that there’s more nuance than is captured here.

 And then I had, the other question I had for you on this chart here is the number of classes available. And I wanted to get your take on the plug-in hybrid electric vehicles. And I asked that because it’s consistent across all of the ranges, from low to bookend. And my understanding is that many manufacturers, like GM, for example, are not going to make the plug-in hybrids, like the Volt anymore, they’re just going straight to battery electric.

 And so I’m wondering about the number of plug-in hybrids staying consistent across that?

 MR. PALMERE: Yeah. That’s certainly, yeah, something to consider. Because when we’re looking at any PEV models, we look for manufacturer announcements of them introducing a new class, and then we’ll add it to our forecast. But you do make a good point, and we have seen that in the Volt being the main example, that it -- once a class is introduced, it’s not necessarily going to stay there forever. So, yeah, I think that’s something to, definitely for us to look into.

 We are -- I think that’s the one attribute we’re still looking at for 2020, because there -- because it does change so rapidly, there are -- we do have some staff in our unit who are reviewing the literature even right now. So, we definitely could end up making changes, and I think that’s a really good point. And something we don’t think about as often, and the possible discontinuation of classes, because we definitely, we definitely focus a lot and do keep an eye on what classes are going to be introduced. But, yeah, I mean that’s something to look at as well. So I definitely appreciate you bringing that up.

 VICE CHAIR SCOTT: Yeah. And then my last one here is just on the cost of hydrogen fuel. And I know that it costs less to make hydrogen fuel now than it did, you know, 10 years or so ago. And whether or not we’re capturing the decrease in costs as we increase capacity on hydrogen within these scenarios. Because I know sometimes we’ve got the fuel costs in there, right, for gasoline vehicles or for electric, and how you’re capturing that for the hydrogen refueling.

 MR. PALMERE: Yeah. We -- yeah, the fuel costs are something that we update along with a lot of the vehicle attributes, and that is for every single fuel -- or every single fuel type a fuel cost input.

 And so for hydrogen, yeah, it’s, as with the other attributes, it’s something we do that goes over the length of the forecast, from, in this case, 2019 to 2030, and we do see the numbers decrease over time. So that’s kind of, as you mentioned, it’s becoming cheaper.

 And with a lot of new technologies, the initial costs are high, but as they have a better understanding and can make it more efficiently, we expect to see it to go down. So, yeah, it definitely is reflected. The numbers come from -- I believe it’s from NREL that we get our hydrogen fuel cell fuel prices from. And so they definitely do take that into account, and we do see, we do see it going down throughout the forecast. It’s still -- I mean, it is, even by 2030, it’s -- we don’t have it reaching like parity with gasoline, but we do have it becoming a lot more competitive.

 VICE CHAIR SCOTT: Okay. Great. So those are the questions I have on this particular chart. Let me ask if any of the other Commissioners have questions on this chart, just so we’re not jumping around a lot, and then we can go up to the next set of questions.

 COMMISSIONER MONAHAN: Well, I have a question on this chart, and then I have a question that actually relates to Bob. So -- but it relates -- it brings in the battery price on light-duty vehicles.

 So -- but let me ask the bigger question first, which is that, I mean, we’re seeing more announcements for longer range ZEV’s, mostly in the luxury class, one can imagine by 2030 that the range that we’re seeing in the luxury class could be reflected in the mid-size vehicles. And I’m just wondering, Mark, what the team’s thinking is in terms of the evolutions. I mean, we’re seeing such rapid evolutions on the battery side, and more and more companies who are just producing ZEV’s, like Rivian, so that we can envision -- I mean, the Rivian truck -- I don’t know if you would call it luxury, because it’s about the same as a Ford F-150, but they’re talking 400-mile range.

 So just what, what’s the team’s thinking in terms of how to capture the evolutions that we’re seeing, pretty rapid evolutions on the luxury side, into the more, you know, average vehicle?

 MR. PALMERE: Yeah. I think that’s a very good point. That we do see the luxury vehicles kind of being the first to develop longer range, and then more -- whatever the, I guess standard vehicles kind of picking it up and gradually increasing range.

 So, yeah, I mean we definitely are -- the announcement from Rivian and similar models is something that we definitely see as a positive for overall fleet-wide range, not just, not just Rivian. And that, that is something else that through the length of the forecast the average range in pretty much every class we do see increases, some classes more so than others. But it’s kind of why we like forecasting 10 years in advance, because it gives us a chance to reflect improvements in the industry that we expect to see. As Vice Chair Scott was talking about, decreased hydrogen fuel prices, and in this case, increased range.

 Another thing that we -- our staff member who does a lot of the fuel -- or the attribute forecast, he likes to weigh kind of cost versus range, because every increase, every like increase in battery size will increase range and also increase price. So we’ve had some discussions about what, like what will manufacturers be focusing on, like decreasing the price or increasing the range, and most likely, we’re expecting some of each. But we do see like, we do increased range throughout the forecast, and, yeah, it is -- there are definitely some vehicles that are driving it more than others, pun not intended.

 COMMISSIONER MONAHAN: Well, thanks. And then a question, I guess it’s for both Mark and Bob, which is that the dollar-per-kilowatt hour, there’s just a little bit different between the medium, heavy duty and the light duty, and I’m curious about, are you using, you know, different criteria for dollar-per-kilowatt in the different vehicle classes? It was a small, I think it was on the aggressive scenario for medium- and heavy-duty was $80 per kilowatt hour? Just wondering if there’s a difference -- why there’s a difference in the range of prices?

 MR. MCBRIDE: Well, yes. The medium- and heavy-duty duty cycles require a more robust battery, so they build in more --

 COMMISSIONER MONAHAN: They do.

 MR. MCBRIDE: -- power ratings and so on. So there’s this factor, 1.3. So we take the light-duty vehicle price, basically multiply it by 1.3.

 And another approach comes out very similar. And that -- I talked with Sam Pournazeri (phonetic), using the ICCT method, which is to -- for medium and heavy use, of battery price, that is the light-duty battery price five years ago. So it’s pretty much a wash. These both come to a very similar place. But, yeah, but a medium and heavy battery is more expensive per kilowatt hour.

 COMMISSIONER MONAHAN: Thank you. And then this is back to Janea. I think I saw Commissioner McAllister and Commissioner Douglas say they did not have questions on slide six.

 So let’s jump up to slide 11, if we could, please. Which I think is this same version, if I wrote the right one down, yeah, of this chart with the medium- and heavy-duty trucks. And so, Bob, I had some questions for you there.

 One is, I was looking at the range, and the range is a constraint percentage of the truck class based on the length of typical trips. And I was wondering if you could give us maybe a little bit more detail or granularity into that? Because what I’m thinking about, is I’m starting to see a lot of announcements by companies like Amazon and others, so that’s probably the medium-duty side of these vehicles, right? And these trucks and driving all over the place dropping off packages to people and things like that, and probably have a fairly high range, would be my guess.

 But I’m just wondering how the -- if the constraint, when you constrain the percentage based on a length of trips, if that’s kind of matching up with what we’re seeing in the industry and what we’re seeing fleets start to announce?

 MR. MCBRIDE: Good question about the announcements. The whole approach comes from the VIUS Survey, which reported the annual VMT for a bunch of the survey respondents. So there’s this fairly easy way to say if you have daily VMT of 100 or 150 miles, depending on the class, you can use battery electric without supplemental charging. So that’s a fairly refined database, and we’re breaking it by brackets of 10,000 miles a year.

 So, up to -- I’m sorry. The year doesn’t matter. The daily VMT is in the range of operation part of this survey. It talks about vehicles that go zero to 50 miles, 50 to 100, 100 to 150 and so on. So for classes, I believe 3, 4 and 5, we’re talking about 100-mile range. And for the tractor-trailers, we’re talking about a larger range, which is 150 at the moment, and most likely will go up during the forecast.

 Announcements are in this area. The ranges are center -- a couple of years ago, they were talking 60-mile ranges for a delivery truck. Now they’re talking 100 miles, which is a great thing.

 The tractor-trailers, you’ll hear announcements all over the map, but the ones being built, for instance, the Volvo-White’s project, they expect 150. So, you know, we’re watching this pretty close. It’s a good, it’s a good point.

 VICE CHAIR SCOTT: Thanks. And then I had maybe a couple questions on the chart, but the next one that I had written down was actually about the CARB rules that you mentioned on slide 13. And I’m wondering, what you said is the truck choice model shows a different level of compliance than, I guess, the level of compliance that Air Resources Board is expecting under the clean truck rule. And I’m wondering how we reconcile that?

 MR. MCBRIDE: Yes. The Advanced Clean Truck Rule is -- has a credit-trading provision, and that’s with this concept called the -- what is it, the weight, the weight classification factor comes in.

 So a fleet might be composed of half Class 6 and half tractor-trailers, and it turns out that they find it’s easier to go to ZEV in one or the other of those classes, they can apply some credits in the other class, and also they can be bought and sold. So other fleets that are smaller, perhaps, at the bottom end of the ones required to -- for ACT, can buy credits from a larger fleet that’s gone ZEV.

 It’s -- I haven’t done this calculation yet, but I do know it’s, for us, it’s going to be a work in progress. I’m concerned about the truck retirement rates. But I think the EMFAC 2017 is a little less aggressive, so the numbers of trucks purchased is just going to be smaller.

 That might not affect us for ACT, because it’s all in terms of percentages. But I think we’re just going to have to watch what happens in each class where I have the electric vehicles, compare it to ACT, and see whether they need more or less. And if more or less is available, that, yeah, that’s -- I’m going to watch that closely.

 VICE CHAIR SCOTT: Uh-huh. Okay. I think that’s helpful. And I think with -- as we did with the passenger cars and trucks with the ZEV rule, I think staying in lockstep with Air Resources Board and kind of running our numbers and assumptions and things back and forth with each other, like we did on ZEV and the light-duty sector, would be important to do with Air Resources Board and the Advanced Clean Truck Rule here in the medium duty and heavy-duty sector.

 MR. MCBRIDE: Yes.

 VICE CHAIR SCOTT: Let me see if the -- if any of the other Commissioners have questions, otherwise I’ll keep going down my list.

 COMMISSIONER MONAHAN: I had a quick one about -- well, it intersects with this Advanced Clean Truck Rule. So I just want to make sure I understand the -- so our -- we’ll compare our model results with ACT regulatory targets. They may not align. And when we don’t have alignment, since I haven’t been here when we did the ZEV, the light-duty ZEV, what do we do? I mean, what’s the, what is our -- do we highlight sort of what would be needed to reach it based on our model? You know, higher incentives or other policies? Just curious about what we do when there’s misalignment between our results and our regulatory target.

 MR. MCBRIDE: Going in, I’m not sure where this is going to land, but, generally, we’ll look for compliance, or a way to comply. Offhand I don’t know which classes are going to do the best. I’m mildly suspicious that the tractor-trailers -- the truck-tractors here, as ACT terms them, are going to do a little better than some of the straight truck classes. But we’re just going to have to see how it goes.

 There’s a couple things we did in the last forecast to -- you know, four different things we did to improve the ZEV proportion of new trucks. We’ll look at those again. And I have to, honestly, I have to dig into how much trading between classes, whether that’s just within one fleet or -- you know, this rule is pretty new, and I understand it reasonably, but not completely in depth. And I’m going to, just going to have to work with it. But I want to see the truck choice model results first.

 I do know that the number of used trucks slated for 2021, ’22, ’23 and ’24 in the EMFAC 2017 is quite significant. So you’re seeing model year 2012 populations keep increasing until 2024. So that’s certainly a barrier to watch out for.

 COMMISSIONER MONAHAN: I mean, this is such an interesting area to explore, and I’ll just say one last comment and then we can move on to a new subject. Which is that, I mean, fleet, and the theory, of course, that fleets are going to be much more sensitive to overall lifecycle costs and fuel price, and less sensitive as individual consumers are in light duty vehicle market, to other attributes that we have, a cool color or a cool look.

 MR. MCBRIDE: Exactly.

 COMMISSIONER MONAHAN: Fleets are going to be more disciplined in terms of the bottom line. And so maybe there is some option eventually to account for that sort of more of a business orientation around fuel price, you know, electricity price or hydrogen price or, you know, these other lifecycle costs that they don’t care about. Which gives us additional tools in our toolbox if we think though, well, how do we incentivize behaviors to allow industries to make a smart business choice.

 MR. MCBRIDE: Very good point. For instance, is it better to incentivize the vehicle or the fuel? And I have no answer at the moment.

 VICE CHAIR SCOTT: All right. Great. Let’s see. I have a few more questions -- hold on. I changed my view. Just checking to see if I see a hand raised over here by Commissioner Douglas or Commissioner McAllister. All right. So let me -- the next question actually is for Heidi on the telecommuting assumptions and scenarios that you laid out for us. And a question that I have is, it looks like those were assumptions and scenarios kind of looking forward from today. I’m wondering if the numbers that we’re starting with match up with what we’re seeing right now on the telecommuting and people working from home, and school at home and things?

 MS. JAVANBAKHT: That’s a good question. We haven’t compared that. I don’t think that there’s data available to do that sort of comparison, but if anyone knows of anything, please let us know.

 So the data that we used for this analysis mainly came from 2018, both -- and around those years, so it’s historical data, but looking at what could happen in the future. So, if that’s helpful.

 VICE CHAIR SCOTT: Okay. Yeah. No, that is helpful.

 Bob, go ahead.

 MS. JAVANBAKHT: So, yeah.

 MR. MCBRIDE: Yeah, sure. I -- there are sources that have real-time data on total traffic volumes and so on. But the problem is, everybody uses surveys, like travel surveys, to pick out what trip purposes -- what proportion of total trips are commuters versus shopping trips versus something else. And, you know, they’re -- we’d have to see a travel survey.

 So, it would be kind of tough to say, you know, maybe the morning peak traffic flow would be mostly commuters, but that’s pretty iffy.

 VICE CHAIR SCOTT: Uh-huh.

 MR. MCBRIDE: I imagine if we all keep watch on literature, somebody’s going to -- like In Ricks (phonetic) or Street Life, will publish something on this that will help us.

 VICE CHAIR SCOTT: Uh-huh. Great. Great. Yeah, I just wondered if it looks -- if we were starting from a point that looks like where we are today, or if where we are today looks very different from the point that we’re starting with. But I can appreciate that we don’t have the real-time data at the level that you are, Bob and Heidi, talking about.

 Another question, Heidi --

 MS. JAVANBAKHT: Yeah. Because historical data is all pre-COVID. Sorry. I -- yeah. I was just saying that all the historical data was pre-COVID.

 VICE CHAIR SCOTT: Uh-huh. Yeah. Okay. Other question that I had for you, it’s kind of a two-fold question, which is the -- you mentioned that we’re not looking at the time-of-use rate for the EV charging load. And I wondered if you could give me a little bit more insight into why not.

 My only example, of course, is my very limited anecdotal story of the first thing that I did with my electric car was set it so that it’s on the absolute cheapest rate for my power. And so I would imagine maybe others did that as well, and that’s different than not paying attention to the time-of-use rate when you’re charging up your car.

 MS. JAVANBAKHT: Yeah. So, I just want to clarify. We are using the time-of-use rates when we’re developing the load shape for the adopted forecast. It’s just --

 VICE CHAIR SCOTT: Okay.

 MS. JAVANBAKHT: -- these scenarios that are outside of the adopted forecast are not using load shapes that are based on time-of-use rates.

 VICE CHAIR SCOTT: Got it. Got it. Okay. So this might, it might be the same answer to my next question, which is -- so it’s actually two questions, but it might be the answer for both of them.

 One is that -- so then when you showed the load shape, the load shape for the electric charging is actually, you see the peak in the middle of the day. And I suspect that if that’s for light duty, the peak is actually going to be at whatever the lowest rate is for that particular user, assuming, of course, that they’re charging from home.

 And then I wondered if that load shape changes based on whether it’s a light-duty passenger car, right, which is probably sitting most of the time, either at work or at home, versus your medium duty or heavy duty, which are going to be potentially running all the time during, you know, during the middle of the day and maybe charging at night. Or school busses, for example, will be running in the morning and in the afternoon, but kind of sitting in the middle of the day and sitting at night.

 So I’m wondering if we have different load shapes for the different types of uses that we’ll be seeing with electric, the plug-in electrics?

 MS. JAVANBAKHT: Yeah. So the load shape model that use for the adopted forecast does have different load shape based on different vehicle classes. So there’s one for personal light-duty vehicles, there’s one for commercial light-duty vehicles, there’s one for destination charging, and then there’s a handful for different categories of the medium- and heavy-duty vehicles. There’s one for busses, and there’s one -- a separate one for Class 7 and 8, and a separate one for Classes 3 through 6.

 So, that’s what we’re using for the adopted scenarios, and it’s based on a study that ADM conducted for us a couple years ago when they looked at load shapes, just for all the sectors across our forecast. So for Nick’s team as well. So they looked at like residential and commercial buildings as well in that report. So we’re using that model, the ADM, developed for the adopted scenarios.

 The scenarios that I presented on our exploratory and outside of the forecast, where we’re looking at, what would it look like if charging patterns changed in order to take advantage of renewables, to reduce greenhouse gas emissions. And on the flip side of that, what if charging patterns changed, which, again, I think is highly unlikely, but if we are looking at a scenario where all EV’s are charging during the peak hours.

 VICE CHAIR SCOTT: Uh-huh. Uh-huh. Okay. Now that helps. Thank you for the clarification. And I think I agree with you. We certainly don’t want all of the vehicles charging at the peak hours, but understanding what that could look like is a useful data point, so.

 MS. JAVANBAKHT: Yeah.

 VICE CHAIR SCOTT: Let me turn to the other Commissioners and see whether they have additional questions.

 Commissioner Monahan, please go ahead.

 COMMISSIONER MONAHAN: I do.

 Well, Heidi, thank you. I love all the scenarios. Actually, all of them are really interesting. And so just appreciate that you guys are going beyond the, you know, normal bounds of analysis to look at these different scenarios. And that the modeling, what it would need for the South Coast to be in compliance with ozone. It’s going to be fascinating. I love the telecommuting and best- and worst case -- actually, Vice Chair Scott had seen how -- the Chair often talks about this EV happy hour that we need, where EV’s plug in at the time when we have a lot of curtailing of renewable energy. And one of the talking points I like to make is that, for certain months of the year, we could charge every single one of our electric vehicles on the amount of renewable energy that we’re curtailing. And so it’s just a lot of energy that if we could pair up, if we could have that happy marriage or the happy hour that the Chair likes to talk about, and which your scenario perfectly models, then we get this great outcome.

 And so how -- you know, the next question is really cool. How do we do that? That gets a little more complicated and brings in CAISO and others. But I do think like this opportunity is something we need to really try to capitalize on. So, just appreciate all the scenarios you’re doing. And I think, you know, scenarios beget scenarios. So I think over time, we could even make the best case, maybe something that Vice Chair Scott initiated with vehicle to grid and school buses and other transit buses, like you can envision the best case actually, could be vehicles giving back to the grid. And I’m not suggesting you do that right away, but, you know, down -- the vision of what does it look like to have a resilient transportation electrification system, and how do we do modeling that supports the vision that we want to get to, and also highlights what happens when we do it wrong.

 So I just really want to give kudos to the team for taking these extra modeling scenarios into account.

 VICE CHAIR SCOTT: Absolutely. Are there other questions? Let me go back to gallery view. Commissioner McAllister, Commissioner -- yes, we’ve got Commissioner McAllister.

 COMMISSIONER MCALLISTER: It’s really not a question. I just, I want to thank all of you for the presentations. And I’m real -- learning a lot actually. I learned a lot about the truck rule and just, you know, keeping my eyes open for new information, which there’s a lot, because I -- it’s good to have an opportunity to soak up the transportation sector a little bit.

 I did want to just say kudos to Heidi and the team for thinking about the carbon content and a lot of these, you know, 8760 load shaping issues that, you know, really are emerging.

 Now that we’re going to have load shapes that we can appreciate and drill into, and increasingly get a granular and localized understanding of what those are going to look like, and the behavior behind them. It starts to look like a big, important load, you know, along the lines HVAC and the other water heating et cetera, that we need to coordinate and send rate signals to, and figure out how to help manage as both a load and -- you know, a large load, important load that needs to be served, but also as a capacity resource that can provide the ancillary services or load shaping to the grid itself.

 So, really, really glad these conversations are converging, and just, again, encourage everyone to talk to your colleagues and other offices and other divisions to get their thinking on this, so we can keep ourselves fully up-to-date across the Commission. So, thanks for that.

 VICE CHAIR SCOTT: Absolutely. I will echo that. Thanks.

 I think I saw Commissioner Douglas shake her head that she does not have questions right now, so let’s turn it over to Heather for, I think we’ll -- are we taking some questions from the audience?

 MS. RAITT: Yes. Thanks, Vice Chair. So -- and Matt Coldwell is here to moderate the questions from the audience. So if the speakers could keep your videos, and we’ll go ahead and -- go ahead, Matt. Thanks.

 MR. COLDWELL: Okay. So I’m going to -- there’s several questions here, so I’m going to turn my video on so you can -- so I feel more a part of the conversation here.

 So, the first question here is for Bob. It comes from Ilene Tutt (phonetic). The question is, why does the CEC -- I think this was sort of addressed earlier, but, Bob, maybe you can just, you can restate this. Why does the CEC assume HVIP will be -- wait. This wasn’t addressed earlier. Sorry -- assume HVIP will be available when there is no funding for this program, and it has already fully subscribed for 2019-2020?

 MR. MCBRIDE: Yeah, that’s a good question. I think in the 2019 IEPR we found that if we had cut off subsidies in the middle of the year, adoption goes down.

 Doing that kind of modeling would introduce a whole other forecast, which is, what is the prospective state funding for HVIP. And I don’t think that’s in my wheelhouse for sure.

 I expressly made that point, that it’s possible we’re overstating adoption, but it really is an impetus to find other funding, or to look forward a few years when we’re talking about not four- to six-percent ZEV, but we’re talking 35-percent ZEV, what -- even though the battery prices come down and it is moving in the direction of parity, I don’t think it hits there by 2030 what kind of funding is going to be required. That’s an open question. And I’m forecasting in this rosy universe where funding is available.

 MR. COLDWELL: Great. Thanks, Bob.

 And, Ilene, if you have any -- you know, any additional information from Bob, please feel free to reach out to the team.

 MR. MCBRIDE: Yeah, please.

 MR. COLDWELL: Okay. So the next question’s from John Bradshaw from Heidi (sic). This is the one that I was thinking had already been kind of addressed.

 But for EV charging, are the scenarios considering just light duty or also medium duty, heavy duty? And if it does include medium duty, heavy duty, how do you think of medium duty, heavy-duty charging being different from light duty?

 MS. JAVANBAKHT: Yeah. So I did cover this a little bit already. So with the best-case scenario, that’s mainly looking at light-duty vehicles just because, for the most part, the medium- and heavy-duty vehicles are on fixed schedules. And so we’re making the assumption that they’re not able to change their schedules to be able to charge in the middle of the day. But for the worst-case scenario we are looking at all sectors, all the light-duty and medium- and heavy-duty vehicles charging during the peak hours.

 And then I covered this a little bit already, too, but we do have different load shapes that go into the adopted forecast for different categories of vehicles, so the personal light-duty, commercial light-duty vehicles. There’s another charge load shape for destination charging, one for Class 3 through 6, on the medium- and heavy-duty side, one for Class 7 and 8, and one for buses. So, John, if you want to reach out to me, I can send ADM’s report that has -- or if anyone else is interested in this as well, I can send you the ADM report that has these base load shapes in it, so you can review those.

 MR. COLDWELL: Great. Thank you, Heidi.

 So the next question, I think this is for Bob, from Mark Roest. How do you factor in conversions from diesel to battery electric?

 MR. MCBRIDE: They are -- not really. We haven’t considered those. I understand it’s a possibility. I’m going to treat them as though they were a new ZEV vehicle. So when they repower, you know, the year of the drive train becomes the current year.

 MR. COLDWELL: Okay. Thanks, Bob.

 I’m scrolling through here some comments. Okay. So it’s a question from John Bradshaw. I believe this was also addressed, but I’m going to ask it anyway just to make sure. It’s addressed -- so, this is for Bob, Bob or Heidi. For your choice models suggests that forecasted MD-HD trucks will fall short of the Advanced Clean Truck reg. Will you compute what kind of incentive would be necessary to meet that -- the ACT?

 MR. MCBRIDE: Yes. Good question. That’s one of the tools available, and hopefully the last one. I think the biggest factor is the truck retirement rate and how many used trucks are coming in. That’s kind of a big lever. But certainly incentive levels are another good one, yes.

 MR. COLDWELL: Okay. So another question from John. And, John, I see your comment here about reaching out to Heidi. I’ll send you over the contact info, or maybe Heidi can do that in the Q&A. Okay.

 So next question from John is, regarding Commissioner Monahan’s comments about EV happy hour, does the CEC have data or forecasts for when and how much there are excess renewables that could be used for EV charging, rather than curtailed throughout the year?

 I’m not sure this is the right group to answer that question, but I’ll -- I don’t know if anybody has any thoughts.

 MS. JAVANBAKHT: Yeah. I can just add. So that heat map that I showed in my presentation of the greenhouse gas emission intensity factors comes from our supply analysis team, and they may have that sort of information. So, John, just send me an e-mail and I can point you to the right people.

 MR. MCBRIDE: I would also add that the number of people charging in the middle of the day will almost require workplace charging. And we -- in the Fuels and Transportation Division we have a program that’s looking at where, where to place chargers and how many, given an expected level of EV adoption. That’s under AB 2127.

 MR. COLDWELL: Okay. So, Heather, that’s all the questions that we have. Maybe if I could, just for second, not only am I moderating the Q&A, I’m also a manager of all these wonderful staff people that you’ve heard do presentations today. So, I just want to thank them all for all of their work and their presentations. So, thank you, team.

 MR. MCBRIDE: Thank you.

 MR. COLDWELL: And I’ll hand it over to you, Heather.

 MS. RAITT: Great. Thank you, Matt. And, yes, and I echo your thanks to Mark and Bob and Heidi. That’s really helpful.

 So we’ll go on to public comment. And RoseMary Avalos from the Public Advisor’s Office is here to go over that. So, if you’re using the Zoom App on-line, you can click the raise-hand function to let us know you’d like to comment. And if you’re on the phone, just press star nine.

 Go ahead, RoseMary.

 MS. AVALOS: Thank you, Heather.

 I will first call on attendees using the raised-hand feature on Zoom. Please state your name and affiliation, and spell your first and last name. Also, do not use the speaker phone feature because it -- we may not be able to hear you clearly.

 Brian, your line is open. You may need to unmute on your end.

 Okay. I’m going to -- okay. Go ahead, Brian.

 Okay. I’m going to move on to Mark Roest. Your line is open. You may need to unmute on your end, Mark.

 MR. ROEST: Better?

 MS. AVALOS: Yes. And please spell your first and last name.

 MR. ROEST: Okay. My name is Mark Roest, M-A-R-K, R-O-E-S-T. That’s E, as in Edward, S, as in Sam, T, as in Tom. I’m with Sustainable Energy, Inc. I’m in San Mateo, California.

 Should I go ahead?

 MS. AVALOS: Yes.

 MR. ROEST: Okay. So I’m just going to read this thing:

“Tony Seba’s disruptive technologies and models point to a steep upward inflection point in BEV adoption, which I would tie to the next generation in solar charging and batteries, plus incentives. Maximum -- total customer and societal benefits and resilience and cost savings come from putting up enough solar to power both building and associated vehicles wherever possible, using solar canopies where roof space -- "

(Connection lost.)

 MR. HARRISON: Mark, if you’re still there, we lost you.

 MS. AVALOS: Okay. I’m going to go ahead and move on to Jaron Weston. And, Mark, if you want, you can come back on-line.

 Jaron Weston, please spell your first and last name, and name the -- if you are -- name your affiliation. And your line is open.

 MR. WESTON: Great. I just want to make sure you can hear me first.

 MS. AVALOS: Yes, we can hear you.

 MR. WESTON: Okay. Thank you. So Jaron Weston, J-A-R-O-N, W-E-S-T-O-N. And I am with San Diego Gas and Electric.

 And so thank you for the opportunity to comment, and we’d also just like to thank you -- the Energy Commission for all of the ongoing leadership in our industry. There’s a lot to consider and push forward as we meet our necessary but challenging goals. And so we thank you for all the work there.

 For all of the strides that California has made as a leader in the country for the ZEV market, this is due to the State leadership and leadership from agencies like the Energy Commission. And then, of course, because of organic interest within California and California citizens. And so we really want to acknowledge that, but we also want to keep our eyes on the goals that we have, and that there is still a lot of progress to be made for meeting our 2025 and 2030 goals. We’re about half-way to the 2025 goals for ZEV adoption, and only at about a sixth of the way for the EV charger deployment.

 And so just pausing my comments here for a second. If it’s not clear already, these comments are meant really on the overall suite of what’s going on with IEPR, not tailored too specifically to what’s going on today.

 So, the comment we really want to make, given the situation in California, where there’s excellent expertise and excellent progress, but still more challenge to meet, is to make sure that the primary focus of all of our policies and efforts remain on EV adoption and infrastructure deployment.

 We think that is being withheld at the Commission, but we just want to underscore the importance of keeping that main focus. There’s of course a lot of other great working -- work going on with -- broadly vehicle grid integration work, encouraging technologies, workforce training, et cetera. And we think that’s crucial and necessary. But the ultimate goal with this is to make sure that EV’s are on the road. That the funding is dispersed equitably, and that there’s charging out there.

 So, we really want to make sure that the IEPR report has that emphasized, and that the audience at the Legislature and California probably knows that that -- that we still have a lot of work to do, and that that should be the focus.

 I see my time’s running out, so I just want to mention really quick that we are excited and looking forward to the CALeVIP deployment here in San Diego County, and looking forward to partner. And thank you again for the opportunity to comment.

 MS. AVALOS: Thank you, Jason.

 We’ll now move on to the attendees on the phone line. And a reminder to dial star nine to raise your hand, and star 6 to mute and unmute your line.

 I’ll give a few seconds for those on the phone, if you want to make a comment.

 Okay. Seeing there are no raised hands, I’ll go ahead and hand over the meeting to Vice Chair Scott.

 VICE CHAIR SCOTT: RoseMary, did you want to try one more time with the person -- there were the two folks, and they -- one of them got cut off and one we didn’t hear from. Do you want to just ask one more time real quick?

 MS. AVALOS: Okay. I will do so.

 For those that are on the phone, in order to --

 VICE CHAIR SCOTT: No, I’m sorry. I just -- RoseMary, I meant there were two people. The first one on your list you had called on, and he didn’t speak. Just to make sure if he happened to unmute himself, he’s ready to speak now, this would be the time to do that.

 And the second person was about a minute into his comments, and I know he was reading those from something.

 So, sir, if you’re not able to jump back on and finish, please do send those to us in writing.

 Just those two folks.

 MS. AVALOS: Okay. Now Mr. Roest has come back on, so I’ll go ahead and open his line, please, for Mark Roest.

 Go ahead, Mr. Roest.

 MR. ROEST: Hello. Can you hear me? Can you --

 MS. AVALOS: Yes, we can hear you now. Yes.

 MR. ROEST: Okay. Great. Let me get back to where -- let me get to -- exit full screen. That’s the problem. Okay. All right. Okay.

“By selling solar stationary storage and charging as a package and financing it, and also converting existing vehicles to battery electric vehicle or purchasing new vehicle -- battery electric vehicles with financing, the user’s cash flow can be kept flat, making finance payments with savings.

 As soon as the financing is paid off, the user’s expenses go down by approximately 20-percent, as energy and transportation costs approach zero. This increases societal disposable income for other purposes by that 20-percent, creating an opportunity to redesign the entire economy for equity and for environmental sustainability and resilience. This applies -- this approach applies to both light-duty and medium- and heavy-duty vehicles.

 By putting solar canopies up over depots, terminals and truck stops, and extending them to nearby streets or other property, as necessary to meet demand, coupled with stationary storage, we can solve the commercial transportation sector’s charging dilemma without impacting the grid.

 When the financing is paid off, independent truckers and small fleets will find prosperity, as well as health and general well-being. This will result in huge benefits to disadvantage communities.

 And we are developing thin film solar PV which accepts indirect and scattered light with relatively high efficiency. When this technology is deployed, it will harvest more electricity regardless of orientation, within limits. It will become important to track these systems separately.”

 That’s what I’ve got. Do I have more time? Let’s see.

 MS. AVALOS: Yes. You have about a little over a minute.

 MR. ROEST: Okay. So -- all right. So we are doing both solar and battery technology as ceramic semiconductor technology, and we are a start-up. We are in the valley of death, so we’re looking for funding. But this work started 50 years ago for the inventor that we work with. And so we do see a five- or 10:1 increase in storage capacity, no safety issues, and long life, long-cycle life and fast charging.

 So, it’s sort of clicks, it checks off all the boxes. And we have basically solved some problems with the anode, and we should be ready to go into alpha and beta production.

 So we think we can hit market, hit the market by 2022 or earlier, assuming we get funding. That’s it.

 MS. AVALOS: Thank you, Mr. Roest.

 And I’m going to give another reminder if there is any more hands raised in -- for comment. You can dial star nine to raise your hand if you are on the phone.

 VICE CHAIR SCOTT: Okay. I think --

 MS. AVALOS: Okay.

 VICE CHAIR SCOTT: This is Vice Chair Scott. You had made the call both on the Zoom and also on the phone a couple of times, so I’m going to assume that we don’t have any comments there, or folks would have weighed in.

 I had -- I just wanted to give the -- Mr. Roest a chance to finish his comments, if he had a chance to dial back in, which he did. So, thank you, Mr. Roest, for your patience with the technology.

 Okay. And then, I thought that there was a person before Mr. Roest that we couldn’t hear, but if not, that is fine. Let us turn to our, our closing remarks here.

 So, I would just like to say, thanks so much to our Public Advisor and to our presenters today, Bob and Mark and Heidi and Matt. Thank you so much. And also our present -- presenters from this morning. And our IEPR team, as always, they do a fantastic job running these and making them as engaging as we can possibly be when we can’t see one another face to face. So I appreciate that very much.

 And let me turn to my fellow Commissioners to see whether they have any closing remarks, and after that we’ll let Heather remind you how to get your public comments in.

 COMMISSIONER MCALLISTER: Well, I’ll just say, reiterate your thank yous. Really great job, Heather, on putting the workshop together. Enjoyed the morning, and what I was able to get from the afternoon. Was not, unfortunately, able to be in here for the whole time. But just good quality and good engagement, and want to just encourage folks to put in their comments. A lot to think about and certainly try to put your best effort in, because this is important stuff.

 And I do see this conversation as teeing off some -- there’s some recurring themes that we’re going to work through in the next IEPR Forecast in 2021, which is a full forecast. And so some of the methodological issues and some of the issues that have come up, in terms of challenges on the data front, analytical questions, things like that, we actually have the opportunity to work through those in a formal way and enhance the methodology for the forecast itself. So, this is really important stuff. I’m really glad to see everyone participating. So, thanks for, thanks for all the leadership among staff as well.

 And on the transportation front, Commissioners Monahan and Scott, you’ve just, you up the level, so thank you.

 COMMISSIONER MONAHAN: Well, thanks everybody. I, too, want to just want to thank the Energy Assessments Division, also the Fuel and Transportation Division. I mean, this is a moment of rapid change in the world of transportation electrification, and I feel like the teams are really up for the challenge, and are looking at outer bounds of scenarios and are adjusting our analysis as we learn more about what the market is doing and what the opportunity is to electrify transportation in all sorts of different sectors.

 So thanks to everybody, and I hope everybody has a good and safe evening.

 MS. RAITT: Great.

 (Zoom recording ends abruptly.)

(The workshop concluded at 3:34 p.m.)

**REPORTER’S CERTIFICATE**

I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were reported by me, a certified electronic court reporter and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

IN WITNESS WHEREOF, I have hereunto set my hand this 5th day of October, 2020.



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of the cause named in said caption.

 IN WITNESS WHEREOF, I have hereunto set

my hand this 5th day of October, 2020.



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Myra Severtson

Certified Transcriber

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