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CALIFORNIA ENERGY COMMISSION

COMMISSIONER WORKSHOP

In the Matter of:	)	Docket No. 20-IEPR-02
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2020 Integrated Energy Policy Report Update (2020 IEPR Update)	)	REMOTE ACCESS WORKSHOP RE: Heavy-Duty Zero-Emission Vehicle Market Trends
	)	
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MEDIUM- AND HEAVY-DUTY ZEVS: MOVING GOODS

REMOTE

WEDNESDAY, MAY 20, 2020

2:00 P.M.

Reported by:
Martha Nelson

APPEARANCES

COMMISSIONERS (AND THEIR ADVISORS) PRESENT:

Commissioner Patricia Monahan, 2020 IEPR Update Lead Commissioner
Chair David Hochschild
Commissioner Fran Inman, California Transportation Commission
Ben De Alba, Advisor to Commissioner Monahan

CEC STAFF PRESENT:

Heather Raitt, Assistant Executive Director, Policy Development
RoseMary Avalos, Public Advisor

PRESENTERS:

Steve Campbell, Prologis
Sara Forni, Ceres
Alex Voets, Daimler
Angelo Logan, Moving Forward Network
Dan Priestly, Tesla
Chris Nevers, Rivian

PUBLIC COMMENT:

Tim Sasseen, Ballard Power Systems
Jaimie Levin, Center for Transportation and the Environment
Nico Bouwkamp, California Fuel Cell Partnership
Ray Pringle, Sierra Club California
David Warren, New Flyer of America
Eileen Tutt, California Electric Transportation Coalition
Diane Moss, California Hydrogen Business Council
Antonio Ruiz, Nikola Motor

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P R O C E E D I N G S

MAY 20, 2020 2:00 P.M.

MS. RAITT: All right. Well, it's 2 o'clock and good afternoon, everybody.

I'm Heather Raitt. I'm the program manager for the Integrated Energy Policy Report. Hopefully you all can hear me.

Welcome to Session 2 of the 2020 IEPR Update Commissioner Workshop on Heavy-Duty Zero-Emission Vehicle Market Trends. I'm going to quickly go over some housekeeping items.

Today's workshop is being held remotely, consistent with Executive Orders N-25-20 and N-29-20 and the recommendations from the California Department of Public Health to encourage physical distancing to slow the spread of COVID-19. Instructions for attending or participating in the meeting were provided in the notice and included both Internet and call-in options. The notice is available on the Energy Commission's webpage.

As part of our new approach with remote access, we have broken this topic into three segments over two days. This afternoon's session on medium- and heavy-Duty ZEVs with respect to moving goods is the second of three parts.

Tomorrow we will feature our third and final session on heavy-duty ZEVs for moving people, and that's going to

start at 1:30 in the afternoon. And wanted to make sure everybody notes that there are separate logins for each meeting, so you're going to want to check the notice to get the login for that tomorrow afternoon.

Also please note that we are recording this workshop and a written transcript will be posted on the Energy Commission's website.

At the end of the session, there's going to be an opportunity for public comments, and if you were in the morning session, we're going to do it a little differently this afternoon. We are not going to be using the Q&A feature. Instead, you can use the raise hand feature in Zoom to let us know you have a comment and we will open your line at the appropriate time. And if you're attending via telephone, you can use the Star 9 function and that's going to let us know, it's going to raise your hand to let us know that you wanted to make comments.

And alternatively, the written comments are welcome and are due on June 11th, and the notice gives you all the information for how to provide written comments.

And with that, I'll turn it over to Commissioner Monahan for opening remarks.

Thanks.

COMMISSIONER MONAHAN: Yes. Good afternoon, everybody. As Heather said, this is our second IEPR session

on heavy-duty electrification and we are very excited to be welcoming you all on this Zoom platform. Hoping everybody is staying safe and that you, too, are learning how to navigate Zoom. We're all learning how to navigate Zoom, so forgive us if we make any logistical errors through, to the afternoon session.

So as I said in the morning, I am continually surprised by how many heavy-duty applications can be electrified, or at least the pier can be electrified. And in this afternoon session, we're really focusing on moving goods. That's one thing that matters a lot, not just for helping California meet its goals for climate change, but also for helping clean our air. Disadvantaged communities are often the ones that are burdened unfairly with excessive amounts of diesel pollution, and the more we can move heavy-duty goods movement towards an electrified future, the better it is for communities and public health.

So one of the themes that is running through all of our workshops are on for the IEPR transportation report is equity. We really want to make sure that we are being attentive to how transportation impacts disadvantaged communities and to be doing all we can to remediate any harmful impacts and to -- and to ensure that all communities benefit as we move to a clean air transportation system.

So I have on me with a virtual dais -- although I

think they have to change the name because who even knows what a dais is? I have Commissioner Inman from the California Transportation Commission with me.

Commissioner Inman, if you want to make a few opening remarks.

COMMISSIONER INMAN: Hi. I'm just delighted to be here, fortunate to be able to listen and learn. And commend the Energy Commission for the success of our morning session in terms of putting it together in a new electronic venue, and look forward to this afternoon and tomorrow.

COMMISSIONER MONAHAN: Great. Thank you.

Well, Heather, I think I'll just turn it back over to you to start the session. I don't think there are any other -- well, are there any other commissioners on the line who want to introduce themselves?

MS. RAITT: I don't --

CHAIR HOCHSCHILD: This is David Hochschild. I'm on, but --

MS. RAITT: Oh, good. That's great.

CHAIR HOCHSCHILD: Thank you.

MS. RAITT: Great. Thank you, Chair. Okay, great.

So we can just launch into the panel. And so it's the panel on moving goods and it's being moderated by Ben De Alba from the Energy Commission. And so we're going to have a short -- series of short presentations from the panelists,

and then some Q&A from the commissioners, and then a discussion, a moderated discussion led by Ben.

So please Ben, go ahead and start your panel.

Thanks.

MR. DE ALBA: Thanks, Heather. Again, my name is Ben De Alba and I'm an advisor to Commissioner Patty Monahan, so it's really a pleasure to be moderating this panel today.

We have a great panel lineup this afternoon and the focus of the conversation will be on zero-emission medium- and heavy-duty vehicles used for moving goods in California. And it's particularly important to have this conversation today because while the goods moving industry provides significant economic benefits to the state, the externalities of moving cargo, particularly on air quality disproportionately impact our most vulnerable communities and underscores the importance of doing this topic from an equity standpoint.

So before I get started, I want to share a major trend in the world of goods movement that I believe sheds some light onto our conversation today, and that's the trend toward e-commerce. The trend toward ordering goods online opposed to buying them in brick and mortar retail store has exponentially increased since the year 2000. And according to the U.S. Census Bureau, national annual e-commerce sales increased from 25 billion in 2000 to 450 billion in 2017.

And if we look at all retail sales during the 2008, 2010 great recession, overall e-commerce sales continued to increase, while brick and mortar sales declined.

COVID-19 is having similar impacts on retail and movement of goods as more and more turn to online shopping to order their goods. We are already seeing this with one-hour and two-hour on-demand deliveries, and the increased reliance on warehousing and distribution centers to support online retail. This trend toward e-commerce has an impact on freight transport. With that said, the zero-emission trucks of tomorrow must meet the demands of the market, and their refueling times need to match duty cycle needs. And we must ensure that the deployment of these vehicles is done so in a way that is least impactful to our communities.

So I'll close this by saying that California is a leader in global and domestic trade, and it’s also a leader in the pursuit of the carbon-free economy. So to continue this leadership, we need to think about how to pair zero-emission commercial vehicles with renewable energy wherever possible.

So with that, I'm going to introduce our panelists one by one, and then we'll have them kick off their short presentations.

So we're lucky to have Steve Campbell from -- who is a senior vice president with Prologis Ventures with us today.

We also have Sara Forni, who is a senior manager of Clean Vehicles at CERES.

And Alex Voets, who is the e-mobility product marketing and sales strategy manager of Daimler Trucks North America.

And we have Angelo Logan, who is with the Moving Forward Network, and a faculty member at Occidental College. And he's also the cofounder of East Yard Communities for Environmental Justice.

We also have Dan Priestly, who is the staff technical program manager for Tesla Semi.

And we're joined with us by -- with Chris Nevers, who is the director of environmental engineering and policy for Rivian.

So I'm going to ask Steve to go ahead and take us into the first presentation.

MR. CAMPBELL: Great. Hey, thanks very much, Ben, for the intro and what a pleasure to be here.

Why don't you go ahead and move to the first slide, please.

Ben? Okay, great.

As I said, what a pleasure to be here and have the opportunity to give the landlord and building owners perspective on the evolution of zero-emission vehicles and EV policy, at which we're very much in the middle of. Prologis

is the world's largest owner of industrial real estate. Our global portfolio consists of 965 million square feet on four continents in 19 major markets. And 140 million square feet of that is here in California, concentrated in the greater Los Angeles area and San Francisco Bay area.

So Ben, you mentioned e-commerce and the growing trend of e-commerce. Prologis has been a huge part and tremendous beneficiary of that growth, and during the time of COVID-19, a significant percentage of our customers have seen massive increases in demand related to online purchasing habits. So an interesting time and an interesting time to be a part of growing reliance on online purchasing and e-commerce.

So energy is topic I wanted to kind of give, and to give the perspective of a building owner and a landlord. I wanted to make some points related to the importance of renewables and the role that they will play in the story as it unfolds around the EVs.

Prologis currently has 215 megawatts of solar operating in our portfolio, 95 megawatts of which are here in California. We've got another 66 megawatts under development, including seven more in California, and a growing pipeline in 2021. Historically and interestingly, about 80 percent of that capacity has gone straight to the grid, it's in front of the meter, and only 20 percent has

been used to support building load. With the wider adoption of EVs and the demands that puts on the grid infrastructure, we expect that ratio in the coming years for us will be closer to 50/50, and believe that the combination of on-site generation, battery storage, robust energy data analytic solutions, and access to a reliable grid-based energy source is critical.

Now, let me ask you to move to the next slide, please.

So this is why it's so important. This is a list of some of our top global customers. We're the landlord to companies like Amazon, Wal-Mart, FedEx, DHL, UPS. You can see them here on this slide. And many of those same companies are the ones who are making commitments and pioneering the rollout of EVs for delivery, primarily, and for heavier duty applications related to freight movement, both on-site and off-site. And so our role as the building owner and the landlord puts us right in the middle of the growing requirements associated with this.

I listened in to this morning's panel and it really came clear that the number one key gating item for EV adoption is charging infrastructure. And we're currently working with all of our top customers who have made commitments for EV fleets for delivery in helping them build out that infrastructure. At the present time here in

California, Oregon, and Washington, we have 15 different projects underway with these customers.

So in addition to the customer side, we have partnerships with major EV OEMs, with energy project finance companies, and numerous established and emerging companies who are working to facilitate the adoption of EVs for various transportation needs. For us, this means infrastructure for employee vehicles, forklift charging, on-site heavy-duty yard vehicles, medium-duty delivery trucks and vans, all the way up to Class 8 heavy-duty trucks. So it's a big focus.

The challenge for us is the typical load requirement in a distribution building is very low. It's primarily lighting load and it's 4 to 6 kilowatt hours per square foot per year. With EV adoption, that number goes to over 100 kilowatt hours per square foot per year, and you can see the amount of demand that puts on the existing electrical infrastructure in areas where we own buildings.

We have current requirements for mega distribution facilities that call for over 500 charging stations for delivery vans, 300 or more chargers for employee vehicles, and overhead charging canopies for heavy-duty trucks for use on-site and off-site. Pulling this off really depends on an incredible unique combination in cooperation between regulatory officials, incentive programs, public utilities in the private sector, and that's where we really view this as

an enormous opportunity for our sector to play an important role in the rollout of the EV infrastructure needed to support this.

So with that, I'll kick it back to you, Ben. And again, very much appreciate the chance to be part of this panel.

MR. DE ALBA: Steve, thank you very much.

Okay. Next up is Sara Forni of CERES. Sara, take it away.

MS. FORNI: Great. Thank you so much, Ben.

And hi, everyone, my name is Sara Forni and I'm the senior manager of clean vehicles at CERES. We are a sustainability advocacy nonprofit based out of Boston and San Francisco, and it's great to be here today.

Next slide.

CERES works with some of the largest and most influential investors and companies in the world to drive clean energy solutions throughout the economy and to tackle some of our most pressing issues, including climate change, water scarcity and pollution, and inequitable workplaces. So thank you so much for the opportunity to speak to the Commission today on medium- and heavy-duty fleet electrification needs, and to provide a voice to the companies that we represent on how California can accelerate the commercial deployment of zero-emission vehicles.

Next slide.

At CERES, I lead our work on corporate fleet electrification and I lead the Corporate Electric Vehicle Alliance, which just launched this past January. The Corporate EV Alliance is a collaborative group of companies with some of the U.S. economy's largest fleets, from compact cars to Class 8 heavy-duty trucks, and from industries ranging from shipping, electric power, e-commerce, to telecommunications. And they're all focused on accelerating the transition to electric vehicles.

The Corporate EV Alliance, or CEVA, which is now at 16 members, supports companies with significant fleet operations in the U.S. in making and achieving bold commitments to fleet electrification. And our current numbers include industry leaders like Amazon, American Airlines, AT&T, DHL, Exelon, Hertz, IKEA, and JLL, and we're growing every single month, which is great.

Our mission is to accelerate fleet electrification by identifying and working to address the economic market technical and policy challenges that companies often encounter when transitioning to electric vehicle fleets. Our priorities include focus areas like increasing vehicle model availability and diversity across the U.S., ensuring vehicle quality from newer original equipment manufacturers, reducing high upfront vehicle costs, expanding access to and

availability of public charging infrastructure, and then also streamlining the process of private infrastructure siting and deployment.

Next slide.

As an example of one of our strategies, the Corporate EV Alliance is working to loosely aggregate and signal our corporate demand for specific types of electric cars and trucks to OEMs in order to expand the business case for the production of a more diverse array of EV models. And one of the primary challenges to fleet electrification that we're hearing companies are facing is the lack of commercially available EV model options to meet their diverse operational needs.

At CERES, we know that the future of transportation needs to be electric and that companies, utilities, regulators, and policymakers have an absolutely crucial role to play in this. It's becoming increasingly clear that companies both want to and need to electrify their vehicle fleets. And I'm really looking forward to speaking more today with you all about what it's going to take to get companies where they need to be, including how companies and automakers can work together to create a robust and diverse EV market that benefits both stakeholder groups, as well as consumers and the environment.

Next slide.

In addition, CERES released a new EV report that you may have seen on May 5th, in coordination with the California Trucking Association, Amazon, and Navigant, which provides suggestions on how utilities and regulators can further streamline and accelerate corporate fleet electrification by providing reliable and affordable electricity from renewable energy, simplifying processes to plan for heavy-duty EV charging infrastructure installation, redesigning commercial rates and demand charges, and facilitating technology interoperability in the EV market, among other key takeaways. There are eight in total. So I'm happy to speak more to that and some of our findings later in the discussion.

And next and last slide.

We also need policies that improve the already sound business case for fleet electrification and accelerate that transition to electric vehicles at all levels. The proposed advance being structural would significantly advance the market for commercial fleet electrification. And so I commend California for taking this monumental and much needed step.

So with that, thank you again for allowing me to provide that short introduction, and I'm really looking forward to further discussing how we can work to streamline and accelerate commercial fleet electrification and infrastructure deployment with all of you today.

MR. DE ALBA: Sara, thank you so much.

Next, we have Alex, Daimler Trucks North America.

MR. VOETS: Hi, yeah. Thank you very much. I'm trying to get my video to go, but I think you have to do it centrally. Here we go.

So, yeah, thank you very much for having me. My name is Alex Voets, I'm the sales and marketing manager for Daimler Trucks North America.

If we go to the next slide, just a quick introduction.

Daimler Trucks is the market leader for commercial vehicles in North America. We have a variety of different brands. We have the Freightliner brand, the Western Star brand, Detroit. We have our Thomas Built Buses that make the yellow school buses, and we also have the Fuso brand. And you get a little bit of an impression here that most of these brands are working on battery electric powertrains in some way or form. And maybe most prominent, our CEO, middle of last year announced that he believes the future is electric.

If we go to the next slide.

You can see what we really see as the main driver for customers and fleets, that they want to move to battery electric commercial vehicles. The first one is environmental factors, then general green and sustainability goals.

The second is cost of ownership. So the trucks are

going to be much more expensive as far as purchasing them, and there's also the up cost investment on charging infrastructure. But once the truck's on the road and running, the running costs of battery electric powertrains is going to be cheaper than their -- than their combustion engine counterparts.

And then lastly, policy and regulations. We expect them to be much more in favor of zero-emission powertrains.

If we go to the next slide.

We can see what are really the most likely use cases for electric trucks and Class 6 to 8 trucks. We think the most logical application is dedicated and repeatable routes. So anything where the truck goes out during the day on anywhere between 150- and 200-mile range and comes back to base for an extended period of time. For example, overnight to charge because there's obviously the inherent need for longer charging times, so therefore the dual time, and then a specific range. So these are the use cases where we see the best for fit.

If we go to the next slide.

I can expand a little bit where we as Freightliner stands, as far as the timeline goes. In June of 2018 is really when we started our first proof of concept to put a heavy-duty truck, the eCascadia, so electrified version of our Class 8 truck, and the eM2, a medium-duty fully electric

truck out.

Since then, we have delivered what we call our Freightliner Electric Innovation Fleet. And you see here that's a fleet of 30 vehicles, 20 eCascadias, 10 eM2s, that run every day in our customers' hands. And the purpose really is for our customers to get used to this and to gain knowledge. But also for us to gain knowledge as we actively work on our series production product.

We're also actively working on expanding this Freightliner Electric Innovation Fleet with an additional eight trucks to have more exposure for more customers with that new technology. So those are two pilot projects before our series production at the end of 2021 and into 2022 when we will see more significant numbers.

If we jump to the next slide.

You can see, obviously, we're all passionate about electric mobility, and we're all wanting to do it, you know, as fast as possible, but there are reasons why it takes some time to put that technology into the market. And first and foremost, of course, is safety. The product needs to be safe with the new technology. It also needs to be reliable and both of those things take time. It takes a lot of miles, it takes a lot of testing. We imply some test standards on ourselves, such as submerging the batteries completely underwater because we want to make sure that the safety of

those products is absolutely guaranteed.

And then also the service networks. We also need to make sure that our dealer and service network is ready for those trucks. If maintenance needs to be performed or if anything needs to be performed on those trucks that our customers need. So unfortunately, there is still some lead time until we see those trucks in volume in the market, but that is needed to do it right and do it safely.

And then we'll -- you can skip over the last slide. I'll use that in the discussion. And that concludes my remarks.

Thank you very much.

MR. DE ALBA: Great. Thank you, Alex.

Next, we'll turn it over to Angelo Logan. Angelo? Angelo, you are on mute.

MR. LOGAN: I'm happy to participate and be on this panel.

My name is Angelo Logan and I'm with the Moving Forward Network. The Moving Forward Network is the coalition of over 55 organizations, including community-based groups, national environmental organizations, and academic institutions in over 20 major U.S. cities, representing over two million members, with a large California contingency.

The Moving Forward Network is committed to resolving the public health harms created by our country's goods

movement systems by achieving environmental justice and climate justice. The Moving Forward Network is led by frontline communities living adjacent to goods movement facilities and hubs.

As you all know, the goods movement system relies predominantly on diesel powered equipment which produces diesel exhaust made up of toxins and climate pollutants. Diesel exhaust also creates CO_2, a major greenhouse gas. Freight transportation worldwide contributes to approximately 3 billion tons of CO_2. Bicarbonate is also a result of diesel exhaust. Bicarbonate is the fine particle matter in short-lived climate pollutants. It has very high global warming potential. Some estimate over 600 times greater than CO_2.

The freight transportation sector counts for roughly 9 percent of U.S. greenhouse gas emissions. And in the next couple of decades, it is expected that ocean wind vessels alone will account for about 17 percent of all man made carbon dioxide emissions.

When it comes to goods movement, the environmental and -- the environment and health impacts, environmental justice communities get hit first and worst. 13 million people live near major marine ports and railyards. These communities are disproportionately working class, working poor communities of color, and have increased health risks from climate change impacts and the toxic air pollution this

industry is responsible for.

Public health studies have consistently demonstrated that children and adults living in the close proximity to goods movement sources have poor health outcomes, including, but not limited to asthma, poor lung development and other respiratory diseases, cardiovascular disease, lung cancer, preterm births, and infants with low birth weight and premature death. African-Americans have a higher risk of health impacts from goods movement, three times the proportion of the U.S., and Latinos, two times the proportion. All this to say goods movement is a major contributor to the climate crisis and to the local environmental health impacts communities have been contending with from toxic air pollution.

For those reasons and many more, it is imperative that California transition away from fossil fuel and internal combustion transportation to zero-emission vehicles. To achieve the goals that are set forth, the state will need to lead with a bigger vision, stronger regulatory measures, and a comprehensive incentive program that will support appropriate infrastructure, interface, and upfront capital costs.

The state will need to expand its effort to build out the infrastructure needed to meet the demands. The CEC should expand its scope to increase collaboration and

coordination across state and local agencies, and should consider the agencies planning and forecasting as a tool to persuade investment and advancing zero-emission vehicles and the infrastructure needed to support it. Our families, our friends, and our communities' health and well-being depend on it.

Thank you.

MR. DE ALBA: Thanks so much for that, Angelo.

Next we have Dan, and then followed by Chris.

MR. PRIESTLY: Hi there, thanks a lot. Yeah, my name is Dan Priestly, and I'm the technical program manager for the semi-trucks at Tesla. So I work primarily in engineering, but also touch on the various production service and other issues.

We are really excited Tesla, you know, traditionally has played in the light-duty space, but we believe firmly in the acceleration of -- to the world to sustainable transportation and energy, and thus, we really want to make electric heavy-duty trucks happen as quickly as possible.

A couple of years ago, we unveiled prototypes showing the capability of 300-mile range on a single charge, and we're also going to be releasing a variant that will do at least 500 miles on a charge. We're really going after operators and fleets to begin with that have centralized facility operations where charging can play a strategic role.

And on top of that, we're really looking for fleets that can leverage high utilization that others have touched on. But lower operating cost is really where electrification of heavy-duty can shine.

So we're really excited to be here today and talk about it, as well as be a part of the overall industry that would do safe electric going forward.

MR. DE ALBA: Great, Dan. Thank you, and we appreciate Tesla's perspective on this topic.

So, Chris, we'll let you give your presentation.

MR. NEVERS: All right. Thanks for the introduction, Ben.

So as you heard, my name is Chris Nevers. I work for Rivian Automotive. I am their director of environmental engineering and policy.

So at Rivian, our goal here is to make the, or keep the world adventurous forever. So you might say, what does that have to do with heavy-duty electrification? Well, key in that statement is forever, and forever means sustainability and sustainability means electrification. And by the way, not just Rivian products as being electrified, but all, all vehicles eventually will be electrified, we believe.

So with that, I'll walk through what Rivian plans to do. I'm sure many of you have heard of our announcements and

what products we plan to be selling. So first of all, our business to customer products consists of a pickup and an SUV, the R1S and the R1T. Both are scheduled to launch in 2021 calendar year, with the pickup targeted to reach a 400-mile range, based on early estimates. The vehicle's not been tested yet by the EPA, so it's not an official number. We do have manufacturing in Illinois, so we'll be assembled here in the U.S. And the engineering is across the U.S., in Michigan, California, up in Oregon, Canada, and even some in the U.K.

Next slide, please.

And then what we're here to talk about doing today are the heavy-duty vehicles, and many of you may have seen the Amazon order for 100,000 2b and 3 heavy-duty vehicles. These vehicles are being jointly developed between Amazon and Rivian. They're primarily last-mile delivery vehicles with GVWRs of up to 14,000 pounds. And a lot of the components here are going to be shared across the pickup, the SUV, and the van. And to go with that, these vehicles are being produced at the same facility to show some of the flexibility that you will have with some of these EV platforms.

And with that, I think we'll leave the policy discussion to the Q&A.

And that's all I have, Ben.

Thanks.

MR. DE ALBA: Great. Thanks, Chris.

And that concludes our panelist presentations. So what I'll do now is I'm going to open it up for our commissioners on the virtual dais to ask questions of our panelists, and then we'll move in to a moderated Q&A from myself.

COMMISSIONER MONAHAN: Yes. Thanks to the panelists. That was really interesting and I do have a number of questions. And, well, this would be both for Alex and Chris and Dan, actually. Which is, the timeline for producing electric vehicles, how are you viewing COVID-19 as impacting that timeline, if at all?

MR. VOETS: This is Alex from Daimler. Maybe I can go first. Yeah, so as I stated, the electric powertrains, electric heavy-duty trucks are more expensive than traditional trucks. So as far as a customer perspective goes, we don't know exactly yet how this is going to play out with COVID, but it is not unlikely to expect that some of the focus on the customer perspective on battery electric heavy-duty trucks is going to be a little further down on the priority list. It is also not unlikely to expect that we'll see some impact to our production timelines that currently will still have to take it a little bit week by week and see where it ends up.

MR. NEVERS: This is Chris, Commissioner Monahan. I

guess I'll go next. Our initial production is out far enough where we don't believe COVID has yet slipped our volume production at all on the Rivian Prime van. So it could -- I'm not saying it couldn't slip the date in the future, but as of right now, it has not affected our production time on our heavy-duty trucks.

MR. PRIESTLY: And this is Dan. We are planning to start production in 2021 and moving forward with the program. We're really committed to, during this time, you know, finding ways to, you know, if we could add value and improve products in any way possible, and working closely with our customers to assess any impact. But at this point, we're still targeting production in 2021.

COMMISSIONER MONAHAN: Thanks. I'm also curious -- in the morning session on port and off-road electrification, we heard that infrastructure was up there as the biggest barrier for transportation electrification. What would you name, maybe, as the top three, three barriers that you would identify as slowing the progress down?

MR. VOETS: This is Alex from Daimler. Maybe I can go first again.

So one thing, as you mentioned, is infrastructure. I definitely second that. We always tell our customers that infrastructure is the first step to take, and that's because, you know, there is lead time involved in implementing

charging infrastructure. And depending on the -- on the -- on each location what the impact is to the day-to-day operation, that all needs to have long-term planning and permitting and discussions with the utility companies. We as the OEM help that process as well, but we definitely advise our customers to work on infrastructure as soon as they, as they know.

The second one, of course, is the funding. A lot of customers are trying to utilize funding for the acceleration of some of these trucks. California has a number of programs in place so that is definitely good to overcome that initial hurdle. So, I'll leave it at those two, probably.

MR. NEVERS: This is Chris. I'll just, I'll jump in. I'll just echo what Alex had said. Definitely the infrastructure is something you have to work with immediately. With the customer, that is a barrier but a lot of these early fleet deployments, they're all going to return to home at night and there's a lot of really smart charging solutions you can employ to address some of the issues you might have with vehicles that aren't part of a fleet.

As far as the upfront costs, it's totally getting fleet owners and operators to recognize the total cost of ownership, and some of the programs in California will certainly help with that, such as LCFS or perhaps even the heavy-duty ZEV mandate and the sister expected fleet rule.

Thanks.

MR. CAMPBELL: And this is Steve Campbell. I'll pile in there, too. From an owner's perspective, one of the -- really the top three barriers start with the long lead time at securing sufficient capacity from utilities, and the fact that a lot of that has not been coordinated. Clearly, utilities typically have not designated teams or individuals to support the defining and delivery on those requirements. And we're finding our customers struggle with the time it takes to have confidence in demand requirements in the associated grade structure in order to underwrite the economics for their projects.

MS. FORNI: Yeah, this is Sara Forni. I can also add on to that. To say that, at least from a CEVA perspective, one of the primary challenges to fleet electrification is the lack of commercially available EV model options, like I mentioned in my introduction, that can meet all of their diverse operational needs.

So while the light-duty EV market has made a good amount of progress in terms of vehicle variety, companies continue to call for additional SUV and pickup options. And then also in the medium- and heavy-duty market, there are significant gaps that exist in the market that are limiting companies' ability to transition to an all-electric fleet.

So we're hearing from companies that they need to see

a variety of options in the Class 2B pickup truck sector, panel vans, step vans, box trucks, utility trucks, and tractor trailers. And they also need commitments from OEMs on model release timing so that they can accurately plan and prepare for the future of their fleet. We're also tracking technical specifications by use case and vehicle type that our companies have asked for that need to be met in order for them to successfully transition their vehicle fleets. And then, if we have time, I can also add a few other suggestions in terms of what policymakers and regulators could do to help streamline the process.

Yes? Okay.

So we recently partnered with the California Trucking Association, Amazon, and Navigant to interview a good amount of commercial fleets, nine to be exact, in various industries, about how utilities and policymakers can better support and accelerate fleet electrification. And fleet own -- it's important to say first that fleet owners and operators and their customers, they want to be part of the solution to reducing the fast growing transportation sector emissions while managing costs. However, the ability to achieve those goals can be accelerated by utility partners, regulators, and the right policies. And so our report flags eight key areas where fleet owners agree that utilities and policymakers can help speed that transition to electric

fleets. But there are few key takeaways in particular that I wanted to flag for this discussion.

First, companies need a streamlined process to help plan for heavy-duty charging infrastructure installation, and that would include a simple pathway to site assessment for electrical capacity, a reliable electricity supply, and then also flexible terms and requirements for charging contract structures or financial agreements.

Second, utilities and regulators should redesign commercial rates and associated demand charges. Companies are looking for time variable and real-time market-based rates that are aligned with rates designed for commercial level demands. And they are also looking for rate options without demand charges or at least with limited demand charges.

And third, technology interoperability. Fleet operators manage a wide variety of different vehicle models that can include multiple competing technology standards, creating unnecessary complications. So they're looking for the industry to move towards standardization in interoperability for both hardware and software. And they want to avoid vendor lock-in, clear interoperable connection standards -- they're looking for clear interoperable connection standards, and they’re also looking for opportunities to manage smart charging across a variety of

software and hardware options. So I'll stop there.

COMMISSIONER MONAHAN: Sara, one follow-up question about this. Did the CERES report focus just on battery electric vehicles or with, you know, and with the suppliers, with the -- I'm sorry, with the companies that you're working with, are they only focused on batteries, or are they also looking --

MS. FORNI: Uh-huh.

COMMISSIONER MONAHAN: -- at fuel cells?

MS. FORNI: We're not looking at fuel cells, it's just plug-in hybrid electric vehicles and full battery electric vehicles and trucks.

COMMISSIONER MONAHAN: Well, I should mention that we do have a hydrogen and fuel cell workshop plan, so we'll be covering the topics as well in another workshop. But I don't want to lose sight of that because I do feel like in that medium- and heavy-duty space, that's actually a place where we're not sure if batteries can meet every single use case. And so there's still, I think, a lot of room for fuel cells to play an important role in the medium- and heavy-duty space.

So my last question -- I've been dominating, I'm sorry, but this is my last one, I promise, which is I'm curious about how companies and manufacturers are thinking about vehicle grid integration question. And -- and if, you

know, for -- they're going to be a benefit to all electricity users from electric vehicles, we have to make sure that vehicles are being charged at the right times of day, and so that they can help integrate renewables and provide important grid services. And I'm curious about how you all are thinking about this question of vehicle grid integration.

MR. CAMPBELL: So this is Steve Campbell. I'll take that first.

I don't think it can be thought of in silos. We really believe that for this to scale, there needs to be a deep and thoughtful pattern that combines renewables with grid restorage. And as Sara mentioned, there needs to be a clear definition on the utilities side of rate structures that acknowledge that the time sensitivity often requires charging to be done during peak demand times.

So we view it all as something that needs to be viewed holistically and not siloed.

MR. PRIESTLY: This is Dan from Tesla.

Just to add on to that, I think that on the holistic front, you know, it's not just -- it's beyond the grid itself, and it has to do with the operations of trucking companies. And, you know, one thing that plays a huge factor in how truck companies operate is traffic. And unfortunately, you know, often, if you're going to drive when there's a little traffic, then you're going to be charging

during peak demand periods, just as mentioned earlier.

And so when we talk about holistic, it's really at a very, you know, broad level. You know, ultimately I think when we talk about the really tight integration potential between vehicles and the grid, you know, ultimately that's a problem that is worth considering, but it pales in comparison, or at least on the near-term time horizon to be, what I think utilities need to be doing and looking at the grid capability, and that is total long-term demands. As we believe that public cost of ownership of owning and operating electric vehicles is substantially less than that of diesel in the long run, it will result in a significant desire from the market to adopt electrification very quickly.

As soon as the economic threshold pass, like I said, it makes sense to operate in an electric capacity, we're going to see a new really fast and high demand to deploy infrastructure, deploy trucks, and use them. And thus, that demand in total electricity is really quite substantial and needs to be considered. And I think that's going to play more of an immediate and an impactful role on how utilities set up their plans and their vehicle to grid tight integration.

MR. VOETS: This is Alex from Daimler again.

I'll echo as well that vehicle to grid communication is very important, integration. Especially, depending on the

use case. So school buses have a use case where they operate at certain hours of the day and they park for the remaining remainder of the day. So even more so important here that standardization is given. Like Sara pointed out, there shouldn't be a market entrance barrier for different proprietary charge plugs or any proprietary communication protocol. So given that, Daimler's also part of the CharIN initiative that tries to commonize a charge plug-in across all commercial vehicles in the future. So that's definitely not something where we want to create any hard barriers.

COMMISSIONER MONAHAN: Commissioner Inman or any other commissioners on the line, do you have questions?

COMMISSIONER INMAN: I think I've unmuted everything. Can you hear me?

COMMISSIONER MONAHAN: Yes.

COMMISSIONER INMAN: Great. Great. No, I just, I really enjoyed them and I think we're hearing some similarities with this morning. Particular, I think Steve and Sara, and talking about some of the policies that we have, some of the rates that we have, you know, we heard this morning from our Class 1 railroads about the need to make sure that we have affordable and reliable source.

And so I think there's, what we're hearing is a lot of work we have to collectively do, I think, to figure out how that will all work, and you know, and it's obviously, in

my opinion, going to be a combination of all of the resources coming together. But we do have, you know, some of our time-of-use rates were written with different objectives in mind, I think. And we've got, at least on the heavy-duty side, and most of them medium-duty side as well, 24/7 demands.

And so I think, and as I mentioned this morning, you know, we've seen through the COVID-19 that these were deemed essential. So I think just making sure that we have that reliable, efficient source for everyone. So appreciate hearing it.

And Sara, I'd like -- like to see your report.

MS. FORNI: I'll make sure I send that over to you. Thank you.

MR. DE ALBA: Okay. Any other questions from the commissioners? Hearing none.

I'll go ahead and take over the Q&A from here. We've covered a lot already. But there are still some topics we can get into.

And I want to bring Angelo into this conversation and ask you, Angelo, what can public and private entities do to ensure heavy-duty electrification supports the state's goals of improving equity and quality of life in disadvantaged communities?

MR. LOGAN: Well, thank you, Ben. And I really appreciate the effort to really look at this through an

equity lens and really address the issues that communities are contending with.

As you all know, in and around goods movement facilities, some of the most disadvantaged communities reside. And so we really need to consider what the both intentional and unintentional consequences are for our communities who are living adjacent to those facilities. Also, in a lot of cases, working in those facilities. So it's a double whammy.

I think it's really important for the -- both agencies as well as private entities to think about how they invest first in these communities because you get both the positive impact of doing the right thing, cleaning the air, addressing the climate crisis, addressing the very localized health impacts. But then you also help to secure a healthier workforce and, you know, as a kind of multiplier, increase economic opportunity in and around those facilities.

So really focusing and then concentrating, you know, collaborating together to first identify those communities that are -- that need the most attention and uplift those communities.

MR. DE ALBA: Are there any particular examples where we're doing that well currently, Angelo?

And feel free, the rest of the panel, if you have any help in this topic, please jump in.

MR. LOGAN: Well, I think, you know, the Ports of L.A. and Long Beach are a good example of where there's a lot of attention that has been put into the efforts. But that, you know, that takes a number of different strategies. It's not just a good faith effort from industries and agencies. It's really about coupling both really strong regulations and mandates with incentive programs. So we need to continue to couple those together so that we can advance the work, and truly address those in the most impacted neighborhoods.

I'd like to identify one particular project that I think needs real attention. I think there's a huge opportunity both for the private sector, as well as the local utilities and local agencies. And that's the I-710 Freeway, which is the heaviest truck traveled freeway in the country, as I understand it. It is the, the main artery from the Ports of L.A. and Long Beach to the major railyards in East Los Angeles and out to the warehouses in the Inland Valleys.

And, you know, that is -- that particular project is under consideration for expansion and there's a real effort, at least a concern, a consideration to make sure that freight corridor is a zero-emission freight corridor. But, as we all mentioned earlier today is that the infrastructure to support a zero-emission freight corridor is a real challenge. So how do we come together with private and the public to ensure that the freight corridor along that 20-mile stretch and

beyond is really viable and it's really going to be a reality? So it's really bringing in the utilities, bringing in agencies to make sure that then the private entity can come in and plug in fine.

MR. DE ALBA: Thank you very much, Angelo.

So this question I'll throw out to the whole panel, and so feel free to jump in. But I'll ask Alex to chime in first.

Most of your organizations are national, but you also operate globally. So what lessons can be learned from your heavy-duty electrification experiences outside of California, and what can you share with those on this panel today?

MR. VOETS: Yes, thank you very much. Actually, I can comment on that. Yeah, we're operating everywhere in the United States and in North America, but also globally. And I think when we have the focus on the United States, California is definitely spearheading a lot of the ideas and a lot of the thoughts that we see for electrification plans and general sustainability goals, when it comes to operating zero-emission vehicles, when it comes to the incentive programs that we see.

When we look to Europe, of course, you sometimes see similar -- similar thought, leadership. But in general, I think looking locally here, most states look to California as kind of a -- as kind of a pioneer in that area. So when it

comes to incentives and policies to drive these, they're definitely in a good position.

I do want to point out, though, that even though we're trying to measure the availability of the zero-emission vehicles oftentimes by the announced set of production dates, we also need to consider the volumes that are available. So even though a set of production dates are somewhere in the next couple years here, what volume is really available needs to be taken in consideration when we think about putting mandates in place.

MR. CAMPBELL: So Ben, I can comment. We have an expansive global footprint, and I'm also heavily involved on the innovation side of Prologis with the investments that we make through our Corporate Venture Fund.

And there's a tremendous amount of innovation being done in this area, both outside of California, across the U.S., but we're seeing it in China where there's been an awful lot of standardization that has allowed for an acceleration of the charging infrastructure to meet various fleet requirements. That's been beneficial.

And in Europe, there's been a lot of work done by a variety of different entities, focusing on subsidizing, particularly in the UK, subsidizing the cost of EV infrastructure by bundling it with other services, like 5G expansion, network expansion, and things like that. So a lot

of great thought out there, much of it obviously is here in California that has been driving innovation. But we see quite a bit elsewhere.

MS. FORNI: Great. And I'll just echo somewhat what other panelists have said that, you know, California absolutely is the leader among states on this issue from your utility programs to fleet pilot programs to port operations. This is really where lessons are being learned. So we want to see more programs, policies, and initiatives like you have in California in other states.

And to achieve that end, we're hoping that California will coordinate with neighboring states and also other states across the country to ensure the expansion of the market, since we are all in this together. You know, many commercial freight carriers don't operate within one state but across regions instead, so it makes cross-state charging infrastructure along freight corridors essential, and that coordination essential.

Our companies need states to work together to really accelerate the deployment of charging infrastructure along those corridors that meet the needs of medium- and heavy-duty electric truck fleets.

And I'll just add on to that that I'm not sure -- I'm not located in California, so I don't know detailed information right now about the HVIP incentive program, et

cetera, but I think it's extremely important that all incentive programs that are offered in California also don't include scrappage requirements. That's been flagged by many of our seasoned members as an issue for them across the U.S.

MR. LOGAN: If I can also add, just to the point that California really is a leader. And I think that one of the, of the states outside of California are really wanting California to take a strong stand on advancing zero-emissions to set the standard so that they're not starting at an uneven pace and making sure that there's consistency across states.

We know that organizations like NESCAUM, which are made up of a number of air quality agencies in the northeast, have weighed in, communicating with California to have a strong zero-emission standard, as well as effort or communication between governors with a effort of signing MOUs and committing to advance in zero-emissions.

So collaboration I think is really important across states, but for sure California is the leader and will set the tone, and I'd say that's important.

MR. NEVERS: This is Chris. I'd like to second what Angelo just said, but also add that as we look at the fleet portion of whatever comes out of the Advanced Clean Truck Rule that states, look at that, and that the requirements and to what extent possible the carded opportunities start at the same time for both the OEM portion and the fleet portion.

One reason is that these early battery electric vehicles, battery electric trucks are going to be high demand, and it might be difficult for some manufacturers to make sure they get to those areas that want them the most with just the heavy-duty ZEV program. You can imagine those states are looking to implement a heavy-duty ZEV program or a fleet rule also probably have, likely have, the cleanest grids and they have the most need for criteria reductions as well. So we really think those tools have to be joined at the hip, as you will.

COMMISSIONER MONAHAN: Ben, can I ask a quick follow-up question to Sara?

MR. DE ALBA: You may.

COMMISSIONER MONAHAN: Sara, you said something that just made me, my curious -- which is that you, your companies recommend that we do not have scrappage programs? Can you just give a little more information about that?

MS. FORNI: Yeah. That you do not put in place scrappage requirements for any financial incentive you have available. Because a lot of incentives across the U.S. right now have scrappage requirements in place, including how states are using some of the VW funds, in that they're only able to replace a certain model year of truck of a certain fuel type, primarily diesel with an electric vehicle or a cleaner truck. So they would like to option to switch out a

newer diesel vehicle for a clean or electric vehicle regardless of its model year.

MR. VOETS: This is Alex from Daimler. I would like to second that because the Volkswagen specifically requires, I think, 2012 or older models. So effectively, somebody who already very proactively switched out trucks to a more efficient newer diesel truck would be disqualified from that program. So I definitely second that, that it's not in the purpose of the incentive.

COMMISSIONER MONAHAN: But just to clarify, there's a distinction between scrappage and the age requirement. Are you saying that it's the age requirement that is of issue or is it the requirement to scrap a vehicle, and when you're swapping it out for a -- an electric vehicle?

MR. VOETS: I specifically talked about the age restriction. Usually our customers do have trucks to swap out, but they might not have a truck that's old enough to qualify to swap out.

MS. FORNI: Yes, I agree with Alex. It's the age requirement.

Thank you for clarifying, Patty.

MR. LOGAN: If I could just weigh in on the scrapping conversation. You know, from an environmental justice and equity perspective, especially within the goods movement sector, we know especially within drayage trucks that when

there is a swap or, you know, basically, you know, the goods movement sector is where trucks go to die. There are -- we see the shift of dirty trucks to and around goods movement facilities where they're drayage or servicing rail or ports and we've seen across -- not necessarily in California, but we've seen across the states where the trucks that were swapped out for cleaner trucks in California, EJ communities in other states have seen an influx of those trucks in their communities.

So, you know, we're shifting the problem into something that we really need to take into consideration and take seriously.

MR. DE ALBA: Just to add on to this topic, the -- do any of you have insights on how a scrappage requirement might impact, say, an owner operator as opposed to a major fleet? Any insights there?

MS. FORNI: Yeah, I can add that at least for CEVA members, a few of our members contract vehicles with the small owner operators, with the smaller commercial motor freight carriers, and a lot of those carriers have been having issues getting newer cleaner electric trucks because of the age requirements alongside scrappage incentives. And so they're -- the companies themselves, they're trying to support the carriers in figuring out ways to design applications in order to still claim those incentive programs

or work with the state to tweak those incentive programs so they would be able to claim the incentive.

MR. DE ALBA: All right. Commissioner, any other follow up on this topic?

I can read your lips, and I think you said thank you.

COMMISSIONER MONAHAN: Oh, yeah, yeah, I did. Thank you. Sorry, I forgot to unmute.

MR. DE ALBA: No problem. Great.

So I want to change this in to a bit of conversation around connecting the zero-emission vehicles to -- zero-emission commercial vehicles specifically to renewable energy. I think Tesla -- Dan, from Tesla agreed that we might hit this point where adoption becomes rampant and we -- and these vehicles are deployed rather fast and we need to plan for that alone.

And as the state continues to pursue its carbon free goals of a carbon free or carbon neutral economy by 2045, we're relying more and more on renewable energy sources.

What can -- what should we be doing to plan for the -- this mass adoption of battery, electric, and in some cases the fuel cell electric vehicle, commercial vehicle?

MR. PRIESTLY: Yeah, I mean, I'll kick things off a little bit. My comment specifically was that, you know, the fundamental -- I think that there's a lot of forecast things that the utilities need to be doing in terms of their long-

term demand. And it's difficult to look in the last 20 years for any relative data in some ways because the problem is the light duty market penetration of electric vehicles is not going to match what we see in the heavy-duty side because light-duty customers tend to buy vehicles based on it's an emotional purchase. You know, it's -- there is a replacement cycle but it's driven by significantly different factors than what we see in the commercial phase.

And on the heavy-duty side, it's really striking about how much energy that we actually use to move goods around. You know, at the end of the day, these vehicles consume a lot of fuel because they have -- they're very heavy, they travel a lot of miles, and those miles are generally high speed because they're predominantly highway driven. And so when you couple that all that together, the amount of fuel we're talking about offsetting is quite astounding.

And so with that, I want the utilities to understand and start to look at it just from a raw energy throughput based on as you start converting trucks over, what that means in terms of total electrical consumption and demand. Because the total cost of ownership for electric is, you know, substantially cheaper and as volumes increase and costs come down, we're going to reach a tipping point where the vast majority of trucking cases, whether it is, you know,

regional, long haul, intercity delivery, you know, agricultural work, it doesn't really matter. There is a tipping point where all of a sudden the vast majority of use cases, it is economically beneficial to going electric.

And so once you hit that period, your demand essentially runs to virtually infinite, you know, over a period of time where we're going through this adoption phase. And so your market penetration ramp is going to look way different in terms of total percentage of vehicles are electric in the heavy-duty phase compared to that of the light-duty phase.

And so with that we just need to encourage all the players to really work that out, the increase demand and electrical generation requirements that come with the shifting over a large percent of the truck fleet as quickly as possible.

MR. VOETS: Yeah, this is Alex from Daimler.

You're absolutely right that there is going to be a significant increase in the demand for electrification and specifically coming from companies that traditionally do not have that high demand. So we're actively in discussions and corroboration with different utility companies around the United States for them to understand and identify what demand they are potentially looking at based on the battery sizes, based on the charging use cases so that we can, you know,

plan and work on this together. But I don't think it's unattainable, it's just a matter of having the right conversations and planning these things out.

And then of course the entire EV ability and electric transportation that's obviously only going to be as green as the grid that produces electricity. So of course the cleaner the grid, the cleaner the overall transportation solution as well.

MR. PRIESTLY: Yeah, and I also want to expand slightly on that in that, you know, when we talk about these sites and, you know, working with utilities, at the end of the day a lot of these projects, you know, yes, they're in megawatts and the numbers get really big really fast. But these numbers are not impossible, they're absolutely attainable.

You know, a truck size with a lot of trucks is going to be in the tens of megawatts charging power needed. And that is something that might found, again, you know, quite large and there will be challenges for sure. But those are on the order of, you know, large factories and other industrial operations that utilities are used to steeling up for.

The difference here is that it's just going to happen in a very concentrated area and the demands for all that is going to go up pretty substantially very quickly. And so

it's not that the numbers are impossible, it's just that both need to plan out in ways to bite it off in, you know, concrete chunks and be able to move quickly and set up the right internal procedures and equipment, you know, covering processes, expansion plans, et cetera, so that, you know, a higher rate of deployment can -- can be achieved.

MR. CAMPBELL: I'll add to that and I agree with all that.

In our perspective, utilities really need to streamline the processes for interconnection and the operation of multiple technologies that ensure a reliable and a portable supply of power. And that's going to look like rooftop solar. It will include battery storage, robust entering data analytical solutions and reliable and predictable power from the grid.

And that is where we think the challenge is. There needs to be a very thoughtful roadmap put it place to help prepare for that anticipated demand that both Alex and Dan referred to. If you look at fleet scaling, really within the next three to five years, the demand curve gets incredible. And I'm not sure there's been enough foundational thought put in to preparing for that.

MR. DE ALBA: Great. Thank you.

So this kind of follows on to that topic. Getting, and Sara, this is a finding in your report about access to

renewable energy. And as we can ramp up and scale, how are the truckers going to get access to this renewable energy? When I think of the trucking industry and the interaction between the deliveries of the first and last mile, I mean, a trucker can go from one warehouse to a retail brick and mortar and the typical ICE trucks today are maybe stopping or refueling in between or they're refueling at a depot behind the fence on that.

But how does that look for a zero-emission battery electric truck? Is it -- are they going to have to rely on a Prologis warehouse to plug in and charge or should there be public access to these truckers that is outside of a warehouse or outside behind the fence line?

I didn't know if you're findings from the report, Sara, have any insights on this topic of access.

MS. FORNI: Actually, I feel like Prologis, Steve might be the best person to answer that question about how you would handle renewable energy off-site -- outside of the depot.

MR. CAMPBELL: So let the turkey run. I mean, honestly to -- to the issue of demand and how you -- how you provide that, it goes to the utility side of this as well. For on-site generation, we happen to have the rooftop real estate to beat that for on-site consumption. But for off-site charging in more of a distributed network, the greening

of that component to something that's going to take very thoughtful planning on the part of the utilities to meet that demand. And it is -- the numbers that we have seen are significant in order to provide sufficient capacity to a distributed network of charging.

COMMISSIONER MONAHAN: Ben, I just keep chiming in because I'm so curious about all the comments that are being made.

So I'm wondering, Dan, your perspective which is pretty optimistic in terms of the fact that we'll reach a tipping point. And my understanding is we'll reach a tipping point pretty soon. I mean, maybe you could give us a sense for the time horizon you think a tipping point will be at where basically the choice will be clear that electric vehicles are cheaper on a TCO basis and the investment should happen and flow that way.

And -- and yet we're also seeing, you know, the only big announcement so far in terms of $100,000 is the Amazon Rivian one. And anything else seems to be coming a little bit more in dribs and drabs.

And I just wonder, you know, is there any indication that you are all having from conversations that large-scale investments will be flowing that will give us more optimism about that near-term future?

MR. PRIESTLY: Yeah, absolutely. I think that there

will be a huge demand. And maybe why we're not seeing, you know, publically relief numbers, you know, that would be observed, you know, high percentages of the trucks that are on the road is because, you know, these are businesses where their, you know, bread and butter, their livelihood is dependent upon having a reliable known working operation.

And so the customers want to evaluate performance and so once they have a chance to put vehicles in their fleet at a volume they consider reasonable enough to get learning from but not so risky as if to, you know, put all their chips in one basket -- all eggs in one basket, then what they'll do is validate, you know, go through a trial period, they go through a pilot learning phase and upon reaching a point of satisfaction, then they'll say, okay, now we're ready to go in with a significantly larger order with the divider to really turn over their fleet as quickly as possible.

I mean, within reason, you're still going to see, you know, normal fleet turnover time and, you know, depreciation as they, you know, would to a certain degree but the -- it might accelerate slightly because, you know, these companies small or large, at the end of the day, they want to reduce their cost and try to run more efficiently. And they believe that after evaluating the performance of the vehicle, that they can do that, they're going to significantly ramp up and we're going to see, you know, much larger orders and

percentage of the market shift towards electric.

And I agree that it's going to happen, you know, in relatively short time horizon. You know, but really what we're going to need is vehicles into pilot hands, and I think a number of the fleets that are (indiscernible) around here today, talked a little bit about that. And once that happens and the customers are comfortable to transition a larger percentage of their fleet over, they will.

MR. VOETS: This is Alex from Daimler.

I would say as long as the interest is high, it's a new technology. Technology customers are going to learn about it and understand the technology. It's also important to understand that on a heavy-duty truck scale, there's no order of 100,000. An order of 100 or 200 trucks is a big order in heavy-duty trucks.

But understanding the economics, understanding how it impacts the day-to-day business, understanding how maybe dwell time and charging time and all the other things that we discussed, installing the infrastructure, how that impacts the business is very important. Because for trucks, obviously if something doesn't work or if a time doesn't work out, that's not an inconvenience, that's a loss in business. So a lot of customers will start with smaller orders, get comfortable, and then really scale out.

What we always recommend, though, is that even though

you start with a small order, you think about the five- and ten-year plan because if you dig up concrete ones and you put in charging infrastructure ones, you better do it so that you are ready to put in five and ten times as many later.

So I think it's just a question of time and a little bit of a ramp up and scaling probe. And then we also talked about incentive and ATRIB and some of the other funding opportunities, this is also a field that takes some time to navigate and every incentive is a little bit different. So really putting the orders in of a hundred of thousands trucks, it's just not as easy as it is on the -- on the smaller vehicles.

MR. CAMPBELL: Go ahead a real quick comment on that.

MS. FORNI: There's some things --

Go ahead, Steve.

MR. CAMPBELL: Yeah. Just amongst our customers, our major customers who have particularly delivery fleets. There's a huge amount of discussion happening right now about preparing for that.

And so in new building deliveries, we're actually installing conduit so that we can easily electrify those buildings and so as customers start to expand and make commitments to electrify their fleets. So there's a lot of talk out there and I think -- I think it's coming more quickly than any of us think, even though the orders have not

materialized fully or have been talked about. We're hearing about preparations being made by major customers who are preparing to electrify delivery fleets.

MR. DE ALBA: All right. Sara, go ahead and respond and then I want to let Commissioner Inman jump in as well.

MS. FORNI: Absolutely. Thank you.

I will say that companies need the EV market to reach the point of maturity where there are EV iterative for most of the favorite conventional options being used commercially today. And companies need to see those vehicles available across the U.S.

I will say that many or some companies want to pilot a small number of several different model options or at least be able to compare them before they make a significant capital investment. So again pointing back to the need for more variety in terms of the different model options available for each use case and vehicle type would be really helpful for companies.

MR. NEVERS: Ben, if I may before you hand it over.

MR. DE ALBA: Sure.

MR. NEVERS: I would note that we are talking about total cost of ownership. And yes, there are different use profiles, obviously, depending on the segment and how the vehicle's being used. But at the same time, some of the larger fleets certainly don't want to be a disadvantage. And

I think if you see one or two large movers adopt electrification and it's a significant total cost of ownership benefit, then you could see as Dan has suggested earlier, you could see a tipping point where no one wants to miss out or be at a competitive disadvantage.

Thanks.

MR. DE ALBA: Commissioner Inman, do you have your virtual hand raised?

COMMISSIONER INMAN: I do. And here's my other hand. Yeah. Hopefully you can hear me.

No, love this discussion. And I was thinking about tomorrow and the session tomorrow we'll deal with our transit operators, I believe, and they've been on somewhat of a parallel journey, perhaps a little further down the road in some instances.

So I'd love to have the discussion we've had with some of those organizations as well because I've heard, you know, some of the challenges in terms of the utility and getting, you know, the timing and everything lined up there too. So we might learn from each other by you all listening in to that and then we can circle back and have a good discussion by what else we can learn from some of our other transportation partners. Clearly, you know, the heavy-duty and medium-duty trucking sectors. A little different but there are also some similarities, I think, with our other

mobility partners.

MR. DE ALBA: Absolutely. That's a great point. Transit sector seems to be a little bit of a head start on some of those appointments of the zero-emission vehicles. So hopefully tomorrow can open, lend some insights into that.

Actually, on that point and sort of drawing from other sectors, the light duty clearly advanced quickly in deploying the zero-emission vehicles, battery, electric and fuel cell.

I mean, they've -- is there any lessons that we can learn from the light-duty sector as we think about rolling out some of these heavy duty vehicles? I guess thinking in terms of charging infrastructure networks, charging at the depot. Any thoughts on that?

MR. CAMPBELL: This is --

MS. FORNI: Yeah, this is Sara from CERES. Sorry, Steve.

MR. CAMPBELL: No, go ahead. You go ahead.

MS. FORNI: Okay. Great.

I know the state that I think that a lot of lessons can be learned for, you know, how -- from how quickly the light-duty market took off with the help and support of incentive at the federal and state level. So we absolutely need to see more demand side incentives available for medium- and heavy-duty vehicle purchases. And absolutely I

acknowledge that this is a really challenging time right now in terms of budget constraints due to COVID-19.

However, despite the challenges, it's really essential that California prioritize funding that would support the decarbonation -- decarbonization of transportation sector. And so we need incentives to reduce the upfront cost of medium- and heavy-duty EVs and charging infrastructure as well as increased fees and polluting internal combustion engine vehicles. And those price signals are going to be really essential for moving the market.

And there needs to also be a candid discussion about ensuring that funding continues to flow to incentivize the transformation and accurately price the cost of more polluting technology.

MR. DE ALBA: Steve, did you want to jump in? And I see Alex also.

MR. CAMPBELL: So -- great points, Sara. And I just wanted to add, some of the lessons we're seeing that are coming quickly in the medium- and heavy-duty side is the need for high capacity fast charging. And -- because a lot of these fleets on the medium-duty side have very quickly turn cycles. And -- and I think have a different load requirement that is going to fundamentally change an awful lot of how we think about preparing for the rollout of these fleets.

So that's my only comment. I think it's a

transformation from a slow off-peak charging environment to a much faster fast charge and sometimes peak charging environment.

MR. VOETS: And yes, from my side. Alex from Daimler.

I guess some of the things we can learn from the -- from the passenger car market is I think that adoption occurs and incentives above and beyond the -- just the financial incentives. So in California we have a couple of lanes that can be utilized by electric cars. If we think about heavy-duty trucks and the Port of L.A., Port of Long Beach, if we think about, you know, like a virtual queue so electric trucks can actually charge instead of inching forward on the -- on the I-710 or have a front of the line pass, those are incentives that would be kind of the equivalent to the carpools had on the electric passenger car.

So I think some other things we can -- we can learn from adoption on electric cars.

MR. DE ALBA: Yeah, that's a point Angelo I believe was making earlier about I-710 project and the call to make that an electric corridor.

Okay. I want to shift gears a little bit because we are in reality in medium- and heavy-duty zero-emission sector is still relatively early. We are demoing these vehicles today and the Energy Commission actually is partnering with

the Air Resources Board to do another drayage truck demonstration.

What needs to happen to really pull us out of this pilot and demo mode? Again, I kind of really get to the not only incentives but any other thoughts or perspectives on where should we be focusing our investments next?

MS. FORNI: This is Sara from CERES.

You know, I think that the Advanced Clean Truck Rule will really help to drive forward the goals of companies and help to move beyond this one pilot per each fleet right now in that, you know, it's going to open up more of a wide range of vehicles for companies to look at and consider and compare, and also increase confidence of EV technology as a whole with more EVs on the road being tested and piloted by companies. More best practices and lessons learned will come out of the whole process.

So ultimately the rule will help reduce upfront cost also by helping manufacturers reach economies of scale by the increased demand.

So I again commend you for the fantastic proposed rule and I think it's going to do a lot of good for California and for the rest of the country.

MR. PRIESTLY: Yeah. And this is Dan, definitely add on to that. You know the Advanced Clean Truck Rule provides, you know, some -- a few key things in that one is that it is

flexible in that there is a wide variety of you state in the beginning how you say it. And while, you know, drayage is a key part of the phase, there are a lot of other places where customer use and the use cases are wide. And it means that having, you know, flexible policies is important. They can serve a variety of different applications and different customer types.

And on top of that, the other thing that's nice about the Advanced Clean Truck Rule is that it's relatively predictable which is another key point and that's actually one area where HVIP has struggled due to the funding concerns. But having very predictable policies and incentives is really great from a customer side to know. Because as we talked about, you know, these things take time to line up. You've got truck replacement cycles, you have to line up infrastructure. And so being able to have to something that can fit your operation regardless of what of it is but on top of it also be predictable in something that you know is something that's going to exist and that you can benefit from is really key.

And we -- I really believe that there's opportunity for in a heavy-duty phase, you know, in a lot of the operations that run high mileage for critical route to start with because, you know, that's where you're consuming a lot of fuel. You know, again, high miles every day, high speed,

that's where you're going to make a significant impact on the environmental output of these trucks. At the end of the day, trucks make up about 3 or 4 percent of the vehicles on the road but it accounts for 30 to 40 percent of the emissions.

And so we can go after the areas where there's a large amount of fuel being consumed, largely due to, you know, high power, high speed, high mileage applications. Those are going to resolve in, you know, having the greatest environmental impact for vehicle phases.

So having a flexible type of incentive and programs that, you know, folks can go after and use in those environments is going to be beneficial for everybody.

MR. LOGAN: Yeah, I think specifically related to the drayage fleets or drayage trucks, we really have to think about strategies and going beyond the pilot projects and into large-scale deployment. Think (indiscernible) specifically with very specific routes and short trips, I think there's real great opportunity to think about strategize -- strategies and incentive programs for mass deployment at a larger scale rather than us getting stuck in pilot.

MR. VOETS: This is Alex from Daimler.

I think there is two aspects. One to stimulate the supply and one is to stimulate the demand. I think on the demand side, we already see the incentives, we see the easing up EV rates, making charging more predictable, having

incentive programs also on the infrastructure side. So I think we have a lot of good things going on there.

On the supply side, like I said earlier already, there is a number of different OEMs, including us, that have announced their set of production date for the battery electric trucks. But what needs to be clear and clearly aligned when we talk about the act mandate and the kind of goals is that they're realistic with the supply that's actually available in the market. Because like I outlined, those cars needed to be safe, they need to be reliable, and they need to have service in the field to obtain -- attain to them.

So those things take time and unfortunately, it's not a matter of, you know, snapping your finger and turning everything over to electric. So we need to make sure on the supply side that the goals are aligned with what the industry can provide.

MR. DE ALBA: Thanks for that.

Okay. Terrific insights. I want to make sure we touch on local barriers to deployment. So if we were talking to local leadership and policymakers, what will we -- what would be some low hanging fruit that we can anticipate could possibly be a challenge or a barrier to adoption of medium- and heavy-duty zero-emission vehicles?

And I want to share an anecdotal story that we've

heard a local noise ordinance. And I spoke to some of you before the panel about this. The traditional diesel truck is loud and therefore there's been some ordinances put in place that prevent sort of nighttime deliveries because -- because of the noise. But one of the benefits of a zero-emission truck is that it's quiet. But those trucks may not be able to shift their delivery times to night so it would be more efficient and there's less traffic.

Are there other examples that we should be looking at on a local level that could be barriers to adoption?

Angelo, I think you're on mute on Zoom.

MR. LOGAN: There we go.

MR. DE ALBA: Go ahead, we can hear you.

MR. LOGAN: Yeah. I was going to -- I was going to mention that in a lot of cities when we're going through the approval process of development specifically properties that have some ownership or jurisdiction within the city, boundaries that the entitlements are I think are really great opportunities current include in requirements for events and zero-emissions through, you know, air emission reduction goals and other goals like the ones you mention where there's a noise ordinance or idling ordinance and/or, you know, included in the entitlements for developments.

So there's some opportunities there but I think the willingness or the political will of the local jurisdiction

needs to be there. And sometimes that's not just the local pressure but also a signal from -- from, you know the state that the infrastructure is going to be available and the, you know, the energy supply will be available so, you know, there isn't as many barriers or as many concerns in putting in those types of requirements in the development agreements.

So I think that, again, it goes back to the coordination and corroboration. A lot of times local jurisdictions look towards leadership of the state leaders and agencies to really inform them of where we are and it's a good time and place to have to make well-informed decisions.

MR. DE ALBA: Thanks, Angelo.

Any other -- any others want to share insights?

All right. I want to change it back to a bit of the trucking, and maybe this is good for OEMs on the panel.

What are your, you know, if you go to sell your clients a zero-emission truck or when you're prepared to go to do that, what are some of the questions you get from them or what are some of the challenges they might have with infrastructure and charging.

And I know we've kind of beat around this but not everybody is going to have a warehouse and it's going to be a different need between a small-time operator and a major fleet operator.

MR. VOETS: Maybe I could shed some light on this.

So I guess from a vehicle perspective, the questions that would always come are regarding the power and some of the payload that electric powertrain has. And quite honestly those are oftentimes a little bit biases maybe like we saw with electric passenger cars in the beginning where people thought of an electric car cannot be as powerful as a combustion engine. But the reality is electric powertrains have a carburetor, instant torque, and instant acceleration. So the power of those vehicles is definitely not a concern at all. And usually those concerns diminish once we put them behind the wheel and we let them drive -- drive the vehicle.

The second question is always would be -- with the charge time. And I guess also sometimes the confusion that you have with the different chargers that are available on the market and the different charge powers and having to really understand kilowatts and kilowatt hours and how they all play together. But comparably small problem to overcome, it just takes that initial education.

And then the third one is really the necessity for kind of a longer time -- longer term planning. Steve was talking about the -- putting in 5 chargers or 10 or 20 down the road. So really having -- having maybe a small project right now but planning out for the longer term future.

So it just requires the thinking to be a little bit more focused on the entire ecosystem with charging and

training, with infrastructure and everything, availability of incentives as opposed to just having to focus on the trucks as it has been traditionally.

So those are usually the questions that will come in the beginning when people get acquainted with those trucks.

MR. PRIESTLY: Yeah, this Dan from Tesla.

And we get some more questions. But I think that some of the other ones that do come on the list a little bit. When we talk about charging is that we really, you know, haven't seen a very clear desire to have, you know, high speed quick turn charging for fleets to enable slip seating operations or drivers get back on the road quickly. And so, you know, the charge rate, you know, whether that, you know, an operation can do an off shift, an overnight file charging or one that needs a very high speed charging. And we're targeting teams of, you know, recovering 400 miles in 30 minutes, end up being only get back on the road very quickly is something that our --

MR. DE ABLA: Dan, I think we lost you.

MR. PRIESTLY: Yeah, can hear me? Yeah, no I happen to -- yeah, I got a phone call at the same time.

But, yeah, we have -- we've definitely seen a desire from our customers to be able to, you know, flat in while you're talking to as many applications in their fleet as possible. So by having fast charging along with, you know,

high range capabilities, we spent a lot of time talking about, you know, how they enable as many routes as possible with greater range and higher charging speeds.

And, you know they definitely see a lot of benefits, both in terms of how those actions table their operation, again, about total cost of ownership.

And then they also ask a lot about like what are some of the additional benefits that electrification can bring? You know, you don't have to have an idling truck in the same capacity. And, you know, that means that the better, healthier environment for the drivers as well as the workers, they're working in the yard and around the vehicle. And, you know, that is something that we've seen time and time again is, you know, have been positively received by customers, including the drivers, and even in some cases, you know, their families and whatnot.

We've had times where we've done various, you know, show events with companies and the spouses of drivers that wanted their drivers into electric vehicles because it's set up to be a, you know, safer, cleaner, better environment. You know, more integration and whatnot.

So, you know, those are some of the ancillary benefits that our customers see by going toward electrification rather than just, you know, using a traditional diesel vehicle.

MR. NEVERS: Ben, I would add that what we're seeing from potential fleet customers is -- is questions around making sure they have the entire scope or landscape, if you will, of all the different incentives that are available. Not just the state level but maybe right down to the local level. Not just for the electric truck itself but for charging or, you know, back up charging or even vehicle to grid, just making sure they have everything in front of them, make a decision. Sometimes it's difficult when you hop from locale to locale.

MR. DE ALBA: All right, everybody, thank you.

MR. VOETS: I have one thing. One thing, too, that comes up regularly is the service and warranty. A lot of customers will have experience for decades with the bigger trucks that they own today and a lot of customers will make their own repairs or service or maintenance on those trucks. So understanding how much they can do with the electric high voltage systems is also a point of interest that we'll hear regularly.

MS. FORNI: This is Sara from CERES.

I'll just add one more thing with regard to the lack of standards and interoperability. With regard to charging, our members are also looking into and looking for guidance on ADA standards for EV charging in private fleets specifically. It's my understanding that there are not guidelines currently

for that. That's something that our companies would like to see.

MR. PRIESTLY: Just a comment on standards topic, you know. And Tesla, as well as Daimler, many other folks that are involved in a working group across the heavy-duty and medium-duty phase including OEMs and customers as well as even EVOC makers and standards, body of representatives that are working on an interface to solve for the entire power application.

And so, you know, the landscape has really changed a lot in the last decade. You know, where we've ended up with some highlanding on the light-duty side and lack of, you know, inoperability. And now that we have sufficient light-duty vehicles out there, there's a real desire to not do that on the heavy-duty side and end up with a more common connector sight and interface that is compatible such that heavy-duty vehicles from a variety of OEMs can visit a variety sights with a variety of EVOC makers and everything just works together.

So those conversations are happening and hopefully there will be, you know, news about some of the directions things are headed in the near future. But I am confident that we're going down a good path and that should be something that most of the fleets should not have to worry about going forward.

MR. DE ALBA: All right, everybody, thank you for that. It's hard to believe that we've already been having this conversation for about an hour and 45 minutes now.

So I think we're going to transition to the public comment. But before we do that, I want to give everybody a chance, maybe take 30 seconds and any final remarks you want to make.

How about we'll start with Sara because you're on the left of my screen.

MS. FORNI: I do not have any final remarks prepared but I'll -- I'll just say it again, you know, that we're -- we're absolutely looking for all EV stakeholders to play a role in the future of corporate for electrification as we do need to accelerate and accelerate quickly in order to stay within a 1.5 degree C scenario to, you know, escape the worst impacts of climate change.

So really hoping that, you know, we'll see more utilities and policymakers around the country step up as California has and shown great leadership in facilitating this transition. So thank you all so much for inviting me here today and I look forward to seeing what's next.

MR. DE ALBA: Thank you, Sara.

Steve?

MR. CAMPBELL: Yeah. Just on behalf of Prologis and everyone else, I wanted to thank you for the opportunity to

be a part of this and we look forward to playing a role in helping to expand the electrification of fleets throughout North America.

Thank you.

MR. DE ALBA: Angelo.

MR. LOGAN: Yes, I want to echo Sara's statement that both to address the climate crisis as well as address the impacts that environmental justice communities have been facing around goods movement facilities and hubs. Now is the time for all hands on deck. Take this as an urgent matter and really coordinate, corroborate across different agencies and local governments.

Thank you.

MR. DE ALBA: Dan?

MR. PRIESTLY: Yeah. Thanks. I really appreciate being included in this and, you know, it's an opportunity to really discuss how a chance to make a real impact on the world.

You know, at the end of the day, Tesla is here to here to help accelerate the world towards sustainable transportation and energy that are particularly in the heavy-duty transportation phase.

You know, it serves this whole B side of the economy that most people as they drive down the road they just have, you know, invisible. Despite the fact there's the biggest

thing, there's these giant boxes, most people just drive right by them. What they just don't understand all the time is that, you know, we're planning out ways to get cleaner and also feed into the total cost of ownership mindset of the operators.

You know, as we make things cleaner and cheaper for the operators, that means that the -- all the goods, everybody's transportation just got cheaper, just got cleaner. And so this is how, you know, civilization improves. This is how everybody saves money and people get wealthier is that, you know, we make incremental improvements day in and day out. And, you know, this step in electrifying transportation particularly in the medium- and heavy-duty phase can go a long way towards impacting a lot of people very beneficially. And looking forward to making it happen as quickly as we can and being part of the solution.

MR. DE ALBA: Thank you.

And we'll go with Alex and then Chris.

MR. VOETS: Yes. Also for me thank you for having us. I think we came very clear that vehicle electrification is a very big topic, it requires a lot of stakeholders and it's great to see the collaboration and different people on the panel echoing similar messages. It's definitely an exciting time to be in trucking and with Daimler, definitely happy to do our part here.

MR. NEVERS: All right. And like to say this on behalf of Rivian, thanks for having us as part of this workshop and we hope to stay involved here and in other workshops as we do deliver tens of thousands of these 2Bs and 3 heavy-duty vehicles over the next -- starting two years out over the next few years after that.

Thanks.

MS. RAITT: All right. Ben, thank you so much for moderating that panel. And thank you so very much for the panelists for your time and your expertise, it's really helpful.

We'll go on to the public comments portion of this. And so it looks like we already have some hands up. But just as a reminder, if you do want to make public comments -- or comments now, you can use the -- in the Zoom platform, there's a raise hand feature, you just raise that to let us know and we will call on you and open up your line.

And if you change your mind, you can always also just use that raise hand feature to un-raise your hand.

And then if you're on the phone and you wanted to make a comment, you press Star 9 and that will raise your hand to let us know that you want to comment.

So with that, Rosemary Avalos from the Energy Commission's Public Advisor's Office is going to help conduct the public comment period for us.

So thank you, Rosemary. Go ahead.

MS. AVALOS: Hi. Hello, everyone.

Our first call-in folks using the raise hand feature on Zoom, please state your name and affiliation for the record. Also spell your first and last name after you are unmuted and before commenting.

So going forward, I'd like to call on Tim Sasseen.

You may need to unmute on your end. Hello, Tim, you may be able to unmute on your end. Okay. Tim, your line is open.

MR. SASSEEN: Hello. Anyone, anyone? Yes?

MS. AVALOS: Tim.

MR. SASSEEN: Can you hear me?

MS. AVALOS: Go ahead and make your comment. Yes.

MR. SASSEEN: Wonderful. Okay. Thank you.

This is Tim Sasseen with Ballard Power Systems. T-I-M; S-A-double S, double E-N. I'm the market developer manager for California.

Thank you again for this very enlightening session.

The infrastructure concerns expressed by Prologis are well appreciated at California's transit agencies who are at present conducting detailed analyses on conversion of their heavy-duty bus fleets to zero-emissions. While demo fleets of a few buses do not require major electrical upgrades, the large fleets of 50 or more buses are finding that hydrogen

provides a far lower infrastructure cost in grid charging and offers intrinsic energy storage, gas refueling, and resilience against grid outages.

Infrastructure can be grown modularly as fleets expand and without lengthy and expensive utility studies and public works projects and are uncoupled to the activities of your neighbors.

Active and expanding fleets such as those in Orange County, Oakland, and the Palm Desert show these costs dropped to a third or less at scale than grid charging, especially when looking at very large fleets of 200 vehicles or more and require no operational changes from those of diesel or CNG refueling.

Truck fleets are likely to find the same advantages in supporting hydrogen freight transport fleets with larger trucks consuming twice the energy or more per day as buses, as Tesla so eloquently described, and having operational schedules that require fixed fueling and maintenance windows.

Liquid and gas zero-emission fuels have the advantage of supply diversity and a competitive marketplace for infrastructure as well as fuel supply.

As building owners look towards their long-lived assets and supplying infrastructure within them, hydrogen allows flexibility as energy mixes change and electrical grid demands rapidly increase.

The truism that transit is discovery is 100 percent applicable to trucking fleets. The larger the fleet, the better hydrogen works.

I'd also like to address scrappage. Regarding scrappage, it will take several years for zero-emission trucks to make some significant changes in overall statewide emissions, though it will happen soon. In the meantime, incentive -- incentives and grants serve well for demonstration in market transformation. Scrappage in this context could actually be quite wasteful. And so a significant numbers of zero-emission trucks are on the road despite older dirtier trucks which will also happen coincidentally as costs lower below the needs for incentives.

Thank you.

MS. AVALOS: Okay. Thank you, Tim.

Moving on to Jaimie Levin. Just a reminder, please state your name and affiliation for the record. And also spell your first name and last name after you are unmuted.

MR. LEVIN: Yes.

MS. AVALOS: Go ahead, Jaimie.

MR. LEVIN: Thank you. It's Jaimie Levin, spelled J-A-I-M-I-E; Levin, L-E-V-I-N. I'm the director of our West Coast operations for the Center for Transportation and the Environment in Berkeley.

CTE is involved now in a number of battery electric

and fuel cell electric zero-emission projects for marine cargo equipment and Class 6 to 8 sized vehicles.

And as we observed in this question of commercialization and moving that needle forward, we've observed some issues that are very relevant to the end users, the truck drivers and the fleet operators that have to be addressed.

Obviously cost is a big factor. But performance issues encompass a number of different factors. One is range, the other is payload. When you look at a Class 8 truck -- drayage truck operation, they may have to pull as much as 82,000 pounds gross vehicle weight. This was mentioned by others during the panel session about multiple shifts being able to turn vehicles quickly in order to do two 8-hour shifts or more. And then addressing multiple duty cycles.

It's kind of the one size fits all concept. If you look at drayage operation, it's not just near port activities. Especially with independent truckers, they may need to be able to handle various duty cycles. And so looking at vehicles that could perform to those standards is absolutely critical in order to achieve our commercialization objectives.

As we've experienced both fuel cell and battery technologies, we see clear advantages with fuel cell electric

drive technologies in each of those categories that I've mentioned. And so I do have a question to the panel. Several have mentioned that they've focused or most of their discussions have really been focused on battery electric, why fuel cell electric would not at least be considered in portfolio options? And I think very specific to Daimler -- or to Freightliner, last year we heard the CEO of Freightliner committed to a battery electric heavy-duty technologies. But recently, Daimler and Volvo announced their commitment to fuel cell electric drivetrains for heavy duty.

So if there's a chance to give a response to that question, I'd appreciate it.

Thank you very much.

MS. AVALOS: Okay. Thank you, Mr. Levin.

And going on to Nico Bouwkamp, your line is open. Just a minute. Okay, your line is open, sir.

MR. BOUWKAMP: Can you hear me?

MS. AVALOS: Yes.

MR. BOUWKAMP: Okay. Here we go.

So my name is Nico Bouwkamp; N-I-C-O; B-O-U-W-K-A-M-P. I'm a technical program manager at the California Fuel Cell Partnership.

I thank you for this opportunity to comment. And I also appreciate CEC's continued participation in our

organization. We really appreciate their input as a partner of our organization.

In the IEPR update context, I'd like to submit a few comments. One thing that has not been discussed and it'd be nice to see it as a consideration as well is that even though Advanced Clean Truck Rule is being put in place is that there is some concern with regards to what vehicles get replaced. I understand the perspective of large fleets that are typically in the forefront of adopting new -- new vehicles but the majority of the fleet that operates on the road is -- are smaller fleets. Often one -- one or two men shops that are not -- do not have the luxury of adopting new vehicles, especially not at the cost that is expected for zero-emission trucks, via the fuel cell and battery electric trucks. So the oldest trucks may not get replaced which is obviously not is an immediate benefit for the surrounding communities and for the emission reduction.

And as I also referred to both zero-emission vehicles are fuel cell vehicles and battery electric vehicles, and I appreciate the comment made by Commissioner Monahan about acknowledging the fact that's both vehicle technologies.

What also appears is that the charging infrastructure is challenging for both charging as well as for hydrogen fast fueling. But in this case, it appears that heavy-duty hydrogen infrastructure can deliver a very well and has

delivered for transit. And this actually also appears to medium- and light-duty.

One question to ask and I heard some reference to it but it would be great if there could be some more explanation and that is I could start as a fueling connector standardization. The hope is that the market will not move forward like the light-duty market has under the separation of standards.

Fueling time is an important aspect. Are we moving forward conventional with significant adjustments for logistics of companies? Fueling infrastructure, the majority of the fleets are small -- small -- small companies. In that regards, it would also be good to hear on the medium-duty side of things from Daimler about that fuel cell products both on the battery electric truck side of things as well as the fuel cell truck.

I heard a comment made about payload. This is an important part with regards to new technology. And one thing about fuel cell electricity as a truck fuel, that concurrently not be guaranteed to be renewable at the nozzle contrary to hydrogen which is required to have new renewable content at the nozzle.

So thank you for this opportunity and we're looking forward to submitting comments to the IEPR update.

Thank you.

MS. AVALOS: Thank you.

Next in queue is Ray Pingle. Okay.

MR. PINGLE: Hi, can you hear --

MS. AVALOS: Your line is open.

MR. PINGLE: Can you hear me?

MS. AVALOS: Yes. Yes.

MR. PINGLE: Hi, so this is Ray Pingle with Sierra Club California. It's Ray, R-A-Y; Pingle, P, as in Paul, I-N-G-L-E.

I first wanted to answer Commissioner Monahan's question a little further in terms of, you know, why haven't we seen as many large orders for trucks? And I would say the primary reason is because there's not that many products out there in quantity yet. Although there is tremendous activity. All the OEMs, Daimler, Volvo, Rivian, Tesla, and many others have made announcements to go into serial production within the next two years. So there will be a ton of vehicles out there.

And as soon as they're available, we believe that there'll be some pretty rapid uptake, primarily because of a positive total cost of ownership. There have been several studies done, total cost of ownership studies done on medium- and heavy-duty trucks within the last year. And they're all showing neutral to positive total cost of ownerships in many applications as soon as now using conservative assumptions.

So we think there will be quite a rapid uptake once the vehicles are available.

I wanted to talk about -- briefly about infrastructure. And the biggest program with infrastructure is the gap between reality and expectations. I think too many truck owners and purchasers think that it'll take a short amount of time and it doesn't. It can take six months or nine months or a year to get that infrastructure. So one is just understanding the time and planning the time.

However having said that, it takes longer than it needs to take. And we had the same situation with solar panels, installing solar panels on rooftops 12 years ago where the PUC and the utilities were all geared around dealing with large 500 megawatt natural gas plants instead of these smaller systems.

So a lot of things can happen to speed up this process, many things are underway. One is and the governor's scope is division for zero-emission vehicles, one of their priorities is working with counties and cities to accelerate the permitting process.

Another thing that needs to happen and the PUC has listed this as something that needs to be done is working with the investor on the utilities for them to speed up their engineering processes.

And one last comment on this is I think it behooves

the PUC working with utilities to have them do advanced planning. We know that warehouses are going to need charging infrastructure, ports are going to need charging infrastructure, airports are going to need it so they should begin right now doing some proactive planning to upgrade the grids to meet these needs.

I think this has been a great session and thank you very much for the opportunity to comment.

MS. AVALOS: Thank you, Mr. Pingle.

The next in line, David Warren.

MR. WARREN: Thank you. The hope --

MS. AVALOS: Your line is open.

MR. WARREN: Okay. Yes, can you hear me?

MS. AVALOS: Yes.

MR. WARREN: Okay. David Warren, New Flyer of America. D-A-V-I-D; W-A-R-R-E-N. I'm the director of sustainable transportation for our company. We're the largest independent and global manufacturer of transit buses and coaches in the world and have a strong presence in California.

Very thankful for the California Energy Commission for your efforts on the infrastructure. I do want to visit one comment that was made earlier in the session regarding charging standards. As the manufacturer of transit buses and coaches, we work extremely hard to make certain that our

buses and coaches charge off of the same infrastructure as consumer vehicles as well as trucks. So we've participated with the Electric Power Research Institute, otherwise known as EPRI and other organizations such as CharIN and such and Society of Automotive Engineers to make sure that our buses use the exact same infrastructure, whether it's battery electric and/or fuel cell electric bus type applications.

So we will participate tomorrow in tomorrow's session where more discussion will be on transit. But I do want you to know that the comments from Tim at Ballard, Jaimie, Nico regarding fuel cell electric buses as well. We are doing everything possible to make sure that we have an infrastructure system that can support multiple types of vehicles and interoperable to anybody's equipment.

Thank you.

MS. AVALOS: Thank you, Mr. Warren.

Next, Eileen Tutt.

MS. TUTT: Hi.

MS. AVALOS: Your line is open now.

MS. TUTT: Hi, thank you.

MS. AVALOS: Hi.

MS. TUTT: This is Eileen, E-I-L-E-E-N; Tutt, T-U-T-T, from the California Electric Transportation Coalition.

Again, I thought this afternoon's discussion was

very, very interesting. I thought it was much more diverse in terms of the challenges than this morning.

I do want to say that I was a little -- I'm a little troubled by the kind of suggestion that electric vehicles are not sufficient to meet the market for medium- and heavy-duty vehicles. I think one thing that we can -- sort of another thing we can translate from the light-duty experience to medium- and heavy-duty, and Tesla kind of alluded to this. Is the -- is the rate of progress and the reduction of cost of batteries have been way beyond what anyone expected. And as a result, the vehicles are less expensive and the technology is more attractive.

And you can end -- the cars that are coming out, the third and fourth, and now almost fifth generation battery electric vehicles that are coming out have much higher ranges. And we heard from Rivian, they're talking about a 400-mile range. Tesla is talking about a 450-mile range. I mean, these are -- these are not -- and that's Gen 1 vehicles. Gen 1 on the light-duty side was not that -- didn't have that kind of range. And now we're saying ranges that are two to three to four times higher than when the original came out.

And so I think that will translate to the medium- and heavy-duty side. Maybe not to the degree, but it will translate in terms of the range of these battery and the duty

cycles that they can meet will continue to advance.

So I just wanted to say that because I do -- I'm a little troubled by this notion that battery electric vehicles are somehow inferior. I don't think that's true, I don't think it's been true on the light-duty side and I don't think it's true on the medium- and heavy-duty side. However, I will caveat by saying that CalETC has long supported both technology types and believes that both will be a solution for our future. So anyway, I just wanted to point that out.

I also just want to make one statement about infrastructure again and that is that I want just to keep in mind that the biggest cost for infrastructure on the battery electric side is already in place and that is our grid. And Commissioner Monahan pointed out that these vehicles connecting to our grid could provide substantial benefits to everyone who uses electricity, whether or not they drive an electric car. And that is kind of a focus of utilities and others. So it's not a disadvantage to focus -- to attach to a grid, it's a huge advantage because that is the most expensive part of the infrastructure. It's already in place and it can benefit from these vehicles.

So thank you.

MS. AVALOS: Thank you, Ms. Tutt.

Next in line is Diane Moss.

MS. MOSS: Hi, thank you so much.

MS. AVALOS: Your line is open.

MS. MOSS: Hi. This is Diane Moss, policy director for California Hydrogen Business Council.

Full disclosure, I also represent some folks in the charging space. So I have a kind of comprehensive hue, I think, of the various positives about the various technology solutions in the zero-emission vehicle space.

And I want to bring attention to the title of this workshop which is zero-emissions. And to folks like Angelo who are living in communities that at this time, especially during the COVID crisis, are particularly vulnerable to respiratory issues and how important it is, this work that everybody is doing today. So thank you for convening this.

And I want to emphasize the importance of having a broad discussion that is inclusive of all zero-emission vehicle solutions. And I really appreciate Commissioner Monahan and others bringing up that there are battery electric vehicle solutions and fuel cell electric vehicle solutions. And some are going to be better than others for different applications. So it's really important to be discussing an all of the above strategy. There's also resource constraints that point to the need for diversifying technology going forward.

On the cost front, Mackenzie has done some pretty comprehensive global analysis that suggests that for shorter

ranges, battery electric vehicles may be the winner. But for longer ranges at 100 to 200 miles or more, it -- fuel cell technologies are going to become increasingly important.

Both of these types of technologies are nascent, albeit very promising and critical. So I really hope going forward that the CEC when you discuss zero-emission vehicle technology solutions in a heavy-duty sector and others, that you will keep the conversation broad, include battery electric and fuel cell electric vehicles. Sometimes these technologies actually go in the same vehicle. So sometimes it's -- I think it can be of value to discuss them separately, but also a value to talk about them together.

As similar to what we were doing in the renewable energy space which I was also involved in. You know, solar and wind, for example, could be discussed separately, but it's also very important to think about these solutions holistically and how they're going to work together complementarity in an ecosystem in order for us to be truly successful at getting beyond fossil fuels and solving the big problems we have to solve.

Thank you so much.

MS. AVALOS: Thank you, Ms. Moss.

Next in line is Antonio Ruiz. Your line is open now.

MR. RUIZ: Thank you. Thank you very much.

This is Antonio Ruiz; A-N-T-O-N-I-O. Last name

R-U-I-Z. I am with Nikola Motor.

I'd like to reiterate what some of our colleagues have said already. And we are appreciative of the opportunity and I really appreciate the fact that CEC is taking the charge to promote zero-emission vehicles throughout the heavy-duty and medium-duty sector. I think that's really important.

I think what I just heard makes a lot of sense. I would like to see a lot more balanced conversation when it comes to zero-emission options because we do understand that electric vehicles and fuel cell vehicles will be used in different applications. And I have to -- I have to make sure I share this with you that we don't see this as competing entities, we actually see them as complementing. So being able to understand where they play a part is crucial, I think it's really important.

It is absolutely true that fuel cell electric vehicles are electric vehicles. The major difference is how the energy's stored, whether you charge it or carry it on as a hydrogen form is pretty much the difference. But they both bring the same benefits and frankly impacts significantly those communities that are suffering today.

So I just wanted to share that and I appreciate the opportunity. Thank you so much for taking the lead.

MS. AVALOS: Thank you, Mr. Ruiz.

Moving forward, I don't see any more public comments with raised hands.

So that will conclude our public comment session.

I'll hand it over to Heather.

MS. RAITT: Okay. Thank you, Rosemary. And to everybody who commented.

So I'll just also add that remember there's an opportunity for written comments due June 11th. And the information's given there how to do written comments and submit a notice. And hoping folks can join us for the afternoon session tomorrow with the last part of the workshop.

And I invite commissioners to make any closing remarks if you'd like.

COMMISSIONER MONAHAN: Yes. So want to thank everybody for participating. It can be hard, I know, to do a lot of Zoom meetings over and over again. I'm trying to figure out still I think the right amount of time for a dialog among the participants and then to have input with the folks that are listening in. So more to come I think we're going to again try to use the technology more richly to be able to have more folks engaged in real time.

So thanks to everybody. Thanks for folks who stuck around and provided public feedback literally, I appreciate that. And I hear the message that those that, you know, do

want to balance portfolio, there is a role to play for fuel cells in the medium-, heavy-duty stage. And we will be having more conversations about that. I think that battery electric vehicles are a bit ahead in terms of the deployment and price dropped that we're seeing in the market. Fuel cells are, I think, advancing just not quite at the quick pace that we're seeing. We have seen it listed directly with batteries.

And -- but we do realize that there is an important role to play for both zero-emission vehicle technologies. And we need to make sure that, you know, we're doing all we can to support a diverse portfolio. And we're doing all we can to reduce harmful diesel pollution as we accelerate their emission technology.

So with that, Commissioner Inman, do you have any final remarks before we head out?

COMMISSIONER INMAN: Let's see, make sure I'm still on my phone here. Let me see.

COMMISSIONER MONAHAN: We can hear you fine.

COMMISSIONER INMAN: Can you hear me okay?

COMMISSIOENR MONAHAN: Yes.

COMMISSIONER INMAN: Okay. So I've pushed too many buttons here.

No, I just want to thank you for including me and look forward to tomorrow as well. And I think, you know,

thank heavens for this technology, it allows us to listen and learn and look forward to having more of these discussions. I think we discovered today that there's lots of areas we can work on. So I think that's great.

So thank you and I'll see everybody tomorrow.

COMMISSIONER MONAHAN: Excellent. Thank you.

COMMISSIONER INMAN: Thank you.

COMMISSIONER MONAHAN: Bye, everybody, have a good rest of your day.

(Thereupon, the Hearing was adjourned at 4:20 p.m.

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CERTIFICATE OF REPORTER

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 23rd day of June, 2020.

MARTHA L. NELSON, CERT**367

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

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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.

June 22, 2020

MARTHA L. NELSON, CERT**367