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BEFORE THE

CALIFORNIA ENERGY COMMISSION

In the matter of:

2020 Integrated Energy Policy Report Update (2020 IEPR Update)	)	Docket No. 20-IEPR-02 REMOTE ACCESS WORKSHOP

JOINT AGENCY IEPR WORKSHOP ON VEHICLE-GRID INTEGRATION AND CHARGING INFRASTRUCTURE FUNDING

REMOTE VIA ZOOM

SESSION 3 - Scaling VGI and Charging Infrastructure

WEDNESDAY, JUNE 24, 2020

1:30 P.M.

Reported by:

Martha Nelson

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AGENDA

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P R O C E E D I N G S

1:30 P.M.

WEDNESDAY, JUNE 24, 2020

MS. RAITT: Good afternoon, everybody. I'm Heather Raitt, the Program Manager for the Integrated Energy Policy Report, or IEPR for short. Welcome to the Joint Agency Workshop on Vehicle-Grid Integration and Charging Infrastructure Funding. This is being jointly held by the California Public Utilities Commission and the Energy Commission as part of the 2020 IEPR Update.

This workshop is being held remotely, consistent with Executive Orders N-25-20 and N-29-20 and the recommendations of the California Department of Public Health to encourage physical distancing to slow the spread of COVID-19.

The workshop is being recorded and we will post a recording and written transcript on our website. We also have presentations from today on our website.

This workshop is being held in three sessions. This is the third and last session. This afternoon's topic is Scaling VGI and Charging Infrastructure.

If you were in the previous sessions, we saw that we were using the Q&A function in Zoom with the capability to vote on questions posed by others. So attendees may type questions for panelists by clicking on the Q&A icon at the bottom of your screen. Before typing a question, please check to see if someone else has already posed a similar question and, if so, you can click the thumbs-up to vote on it and it will move the question up in the queue. Questions with the most thumbs-up or clicks will be up-voted to the top of the list. We'll do our best to respond to all the question but are unlikely to elevate all of them due to time restrictions.

We also plan to conduct a poll today to get some feedback on how we're doing with the Q&A.

I'll go, quickly, over how to provide comments on the material in today's workshop.

There will be an opportunity for verbal comments at the end of this session. In Zoom, you can click the raise-hand icon at the bottom of the screen to let us know you'd like to make a comment. And if you change your mind, just click it again and the hand will go down.

For those not on Zoom and on the phone, you can press star nine and that will raise your hand.

Alternatively, written comments are welcome after the workshop and they are due July 15th.

So with that, I will turn it over to Commissioner Monahan.

Thank you.

COMMISSIONER MONAHAN: Great. Thanks Heather.

Well, welcome to the afternoon IEPR workshop. This is a conversation I'm really interested in pursuing. So right now you -- most charging investors are not turning a profit and they need public investment to be able to compete economically. And so we need to get to a point where there is a sustainable business that forges without support by government. And I think that's a question we'll be wrestling with, is how -- what are the conditions that we need to get to that place?

And so I want to -- I'd rather turn this over to the discussion because I think we've got a really great panel of folks to talk about these

issues.

And I see, I have my fellow Commissioner from the Public Utilities Commissioner, Cliff Rechtschaffen, going on video.

Cliff, do you want to make any opening remarks?

COMMISSIONER RECHTSCHAFFEN: I don't, Commissioner Monahan. I'm really to jump right in.

COMMISSIONER MONAHAN: All right. Excellent.

And, Commissioner Douglas, I know is on as well. I guess, if you're interested in speaking, just show your video and we'll turn to you.

COMMISSIONER DOUGLAS: Uh-oh. I showed my video to say hello but I don't need to make any introductory remarks or words. Good afternoon and I'm looking forward to getting going.

COMMISSIONER MONAHAN: Excellent.

Well, why don't I turn it over to Noel, who is going to talk about how -- one idea for transitioning charging funding to establish a business case. And Noel Cristostomo is our

resident expert on all things related to vehicle-grid integration. He came, actually, from the Public Utilities Commission. We stole him from Commissioner Rechtschaffen and his team which he's still angry about. So let me turn it over to Noel.

MR. CRISTOSTOMO: Thank you, Commissioner Monahan.

Good afternoon everyone. My name is Noel Cristostomo and I'm an Air Pollution Specialist in the Fuels and Transportation Division. I'm slated to speak about transitioning charging funding to the business case as a way of kicking off this afternoon's talks. And so I will draw upon lessons from electricity policy that could apply for transportation electrification by proposing that public sector charging investments emulate a policy and economic model that was responsible for introducing competition in the electricity market and mobilizing an exponential increase from the deployment of independent solutions providers, also amidst a global economic crisis, albeit 40 years ago.

Can I have the next slide please? Now my Zoom is frozen.

Can people hear me? Patty's --

MS. RAITT: This is Heather. We can hear you. And you're on slide two --

MR. CRISTOSTOMO: Okay.

MS. RAITT: -- Introduction and Key Messages.

MR. CRISTOSTOMO: Okay. Okay. Great. This is an earlier version of the PowerPoint. I will try to get through this anyway.

So this model was responsible for introducing competition in the electricity market and localizing exponential increase in the deployment of independent solutions providers, albeit an earlier global economic crisis. And so as I'll describe on the next slides, the Public Utilities Regulatory Policies Act, or PURPA, introduced competition from independent power producers. Before this law, utilities operated as vertically integrated monopolies owning distribution, transmission, and generating facilities.

PURPA required electric utilities to purchase power at the utilities of what it costs from so-called qualifying facilities due to the minimum eligibility requirements established at

the Federal Energy Regulatory Commission. This avoided costs, the costs that a utility would incur if it chose to either provide the energy itself by building new capacity or purchase energy from non-qualifying facilities. PURPA was responsible for bringing 3 gigawatts of QF generating capacity into California alone over ten years and saving ratepayer costs.

It also forms a basis for the alphabet soup investment mechanisms that we have today, PPAs, the RPS, energy service contracts, or ESCs, energy metering and more, which can help with the EV challenge shown on the next slide or on the left hand of this slide. So while PURPA helped propel the 1970s energy crisis by increasing the efficient local production of oil, the combustion of that oil, unfortunately, contributed to today's environmental challenges. Worse, our drive to solve those problems has hit a speed bump with the pandemic and economic crisis which disproportionately affects disadvantaged communities. This history is not intended to cause despair but, instead, to encourage us by showing how impactful positive benefits could be if we apply similar principles and market forces

toward our TE goals.

Meeting California's goals requires a policy and economic model to deploy charging infrastructure for the full scope of transportation at the scale and speed needed to attain our state's objectives.

So in the previous slide, I showed Bloomberg's electrification curve which begins to flatten in the 2030s because of an infrastructure cap. To release this cap, easily understood market signals that drive investments are needed. They must account for benefits, align stakeholders efforts, and catalyze private sector investment.

And, importantly, if we are to succeed in meeting our global climate targets, this metric should be replicable to support TE expansion in jurisdictions with fewer resources within California and elsewhere.

So in the next slides I'll explain how this conceptual PURPA analog for transportation electricity, or TERPA for short, can work, and a key metric that can crystalize various stakeholder's approaches in charging in the vast latent but uncapped value of VGI that we

discussed on Monday.

The conception -- sorry. Go back to the prior slide.

The conception of a Transportation Electrification Regulatory Policies Act initiates from the regulatory compacts within PURPA that the utility has a responsibility to serve electricity to customers at just and reasonable rates. As described earlier, PURPA obligated the utilities to meet these needs by requiring the non-discriminatory interconnection of and purchase of power from qualifying facilities that meet the FERC's eligibility requirements for technology efficiency, reliability, and safe interconnection. Existing law in California enhances this basic premise of a utility service to meet environmental and equity objectives through the deployment of EVs and, specifically, Public Utilities Codes emphasize this today, specifically, 740.12 of the PU Code, where TE programs and investments shall minimize overall costs and maximize overall benefits.

As illustrated earlier, the industry must grow to serve EV needs for energy in compliance with the law cost effectively and expeditiously.

And so I conceptualize that this independent charging infrastructure could grow exponentially, like we saw with qualifying facilities, by creating an obligation for utilities to connect and investment in charging services based on the needs mutually defined and measured at the avoided cost of charging.

Similar to the avoided costs of generation, the avoided costs of charging would be the cost a utility would incur if it had to build or purchase charging infrastructure itself but for the existence of charging infrastructure from an alternative EV services provider. In this case, EVSP would be qualified to be capable of delivering sufficient power safely and efficiently and in compliance with interoperability standards. On the next slide, I'll provide a formula to calculate the avoided costs charging to address the market analytical challenges we face today across agencies.

Inspired by Policy Utilities Code section 740.12, Part B, the avoided cost of charging in its most basic form is the ratio of investment needed to enable a given capability for charging in dollars per kilowatt hours. Fortunately,

minimizing costs and maximizing benefits intuitively results in a value that's aligned with the utilities goals, first, to reduce societal costs of providing reliable electricity services.

This challenge and -- this is a challenge and an opportunity for electric vehicles because there are several ways to invest in charging, on the left-hand side of this graph, use it, in the middle, and result I a certain level of emissions reductions on the right-hand side of the graph. For example, assumptions around cost and benefits may be the subject of debates about use cases, longitudinal data might not exist, or this might be confidential.

The three factors used to drive the avoided costs of charging were chosen because they can resiliently balance the tension between flexibility and accountability because companies' requests for public dollars, their power installed, and the hours that they are used are straight forward and can be documented today, but also as the market evolves to new targets, technologies and customers, and these can be instantly tracked to ensure accountability for

ratepayers perceptions. And for utilization, the factor could be measured with a blend of hours projected, measured -- blend of measured hours or projected hours to allow for flexibility and to ensure that new technologies can come into the market quickly.

Measuring the avoided costs across different vehicle use cases can provide a fair assessment of the range of charging approaches, whether it be financing strategies or the way to mitigate grid impacts when the range of -- being able (indiscernible) and the users. And so unifying our cost-benefit analysis around a metric is critical to avoid discriminating against technology providers' desires to investment in technologies so that there are future proofs to accrue benefits as segments of new EV customers become viable and markets open to provide vehicle-grid integration services.

And so in this way the avoided cost charging enables program administrators to economize among utility and independent alternatives, but it also ensures that our efforts to create a level playing field for competition is elevated based on the

implementation of technical standards that protect customers.

On my next slide, I will wrap up. Panelists won't need to respond directly to this concept in detail, as it was just docketed and published earlier today, but it is intended to offer some things to think about during our panels. For example, in Carrie's panel upcoming, we could think about whether using a common metric, like the avoided cost of charging, can help provide the clarity for investors in both TE and VGI solutions? We can also think about whether the avoided cost of charging as its designed could balance accountability and flexibility?

For Tim's panel, we could think about how investment -- having metric of investment per capabilities is brought into the EVSP's design of their technologies and services and how TERPA could create new financing mechanisms for EV infrastructure?

And so to conclude, we'd like to solicit feedback from stakeholders to assist in further developments of this concept for consideration during our efforts in pursuit of grid integrated

charging.

The appendix of this deck explains the process for analyzing different solutions, costs of charging, planning for insufficient -- planning for sufficient infrastructure for attainment and decarbonization, the principles to compare different alternatives, and ways to budget for sufficient charging infrastructure.

On my last slide, I provide additional resources about this topic and my contact information for questions and comments.

Thank you for listening and I look forward to your feedback.

MS. RAITT: Commissioners, did you have any -- this is Heather Raitt -- did you have any questions for Noel before we move into the panel?

COMMISSIONER RECHTSCHAFFEN: Well, I have a question.

Noel, are the other panels going to comment on your concept generally or just use it as a touchstone for other ideas?

MR. CRISTOSTOMO: It is something I've introduced during prior CPUC workshops around SB 350 TE metrics and the test metrics. Panelists don't need to talk about it in detail but, if you

have thoughts, I'm happy to take one of them quickly.

COMMISSIONER RECHTSCHAFFEN: Okay. Well, I have two thoughts. One is if you really are just -- I think this really reflects a secret desire to come back to the PUC. Because if you want to resuscitate PURPA, expand it to other context, your home's at the PUC, not at the CEC. I'm just saying, just saying.

Commissioner Monahan, the more serious question I have is rather than go through avoided costs of product, why not do something more direct, like have a reverse auction or some other requests for proposals where utilities or some other third-party entity just seeks the lowest cost charging infrastructure from whoever bids into the process? Wouldn't that be more direct?

MR. CRISTOSTOMO: Yeah. If you go to one of the following slides in the appendix, I actually lay out the economic principles in which a reverse auction or an RFP could seek out the lowest cost charging solutions. And so reverse auctions for up-rated cost metrics could be utilized to determine -- yes, exactly, this slide -- the various willingness to pay of

implementing a sufficient level of charging infrastructure to meet an environmental constraint.

COMMISSIONER RECHTSCHAFFEN: Okay. Thanks.

MS. RAITT: Okay. This is Heather Raitt.

COMMISSIONER MONAHAN: Yeah. And I actually --

MS. RAITT: Go ahead please.

COMMISSIONER MONAHAN: -- well, I don't have a question but I am -- when we get to the panel discussion, I'd be curious to hear what the panelists think of this concept.

COMMISSIONER RECHTSCHAFFEN: And I'd also be curious to what the panelists think about this slide in particular because there's simpler -- a simpler idea of reverse auction mechanisms that don't have to fit within a larger framework of TERPA or, you know, the PURPA ecosystem.

Thanks.

MR. CRISTOSTOMO: Thank you.

MS. RAITT: Okay. I think that's a great transition. This is Heather Raitt again.

To move on to our panel on the Investment Prospects for Scaling VGI. And our Moderator is

Carrie Sisto from the CPUC.

Thank you, Carrie. (Clears throat.) Excuse me.

And Jonathan Bobadilla from the Energy Commission will help moderate Q&A from attendees.

So take it away, Carrie. Thank you.

MS. SISTO: Thanks, Heather and Noel, for kind of setting the stage on a lot of the important issues we're grappling with as we try to identify the least cost strategy for achieving our statement goals.

As Heather mentioned, I'm Carrie Sisto. I'm an Analyst at the CPUC. Hi again. I spoke in depth earlier this morning. And I have the privilege of moderating the initial panel of experts this afternoon. They all have a lot of experience and knowledge to share with us about their efforts to both implement and, also, attempt to scale different types of vehicle-grid interesting strategies. So each panelist will have about five minutes to introduce themselves and their organization and how it connects to our VGI discussion today. And then I'll turn to the Commissioners to ask questions once those intros are done. And then we'll have a moderated panel

discussion and some questions from the audience.

So those of you who are attendees, please, be sure to provide us your questions in the Q&A box that Heather described.

We're going to start this panel hearing from Simon Lonsdale, who is the Cofounder and Head of Sales and Strategy for AMPLY Power. AMPLY provides turnkey charging as a service and energy as a service for electric vehicle fleets. And Simon previously worked at ChargePoint as their Chief Strategy Officer and Head of Business Development, and was also previously a board member at a nonprofit called ROEV, R-O-E-V -- I am not familiar with that but happy to learn more about it after the panel -- which was an early effort to simplify EV charging in the public for drivers by allowing a no-cost roaming between charging networks.

So I'll turn it over to you, Simon.

MR. LONSDALE: Thank you, Carrie.

Good afternoon, Commissioners and audience. Thank you for inviting me onto this workshop and from being able to participate. I'm very pleased to be here on behalf of AMPLY.

As Carrie said, I've been in the space of

electric vehicle charging for almost a decade. And we set up AMPLY about two years ago because we recognized the need for fleets requiring help to electrify. A fleet is there to deliver people if it's buses, school buses, transit buses, if they're to deliver goods, if it's trucks and vans, we also work with fleets of cars as well, but their job is to make those deliveries. And as they look to electrify, their fleet starts to transition from being diesel or other alternative fuels towards electricity. And they're hit suddenly with the complexity of electricity as a fuel, compared to the relatively well understood method of purchasing gallons of gas, gallons of diesel.

So AMPLY stepped into, in the sense that noel was using, to be an EVSP for these fleet operators and provide a wrapped up turnkey solution for their electric vehicle charging. That can include the financing and the equipment that's needed for electric vehicle charging, whether it's overnight charging applications or whether it's rapid charging applications of a fleet.

We can also finance that and amortize it

over the term of the useful life of the charging equipment. We also minimize the energy costs and will take on that energy risk that comes of being able to charge the vehicles and the complexity of time of use, demand charges and other demand programs that can help reduce the cost.

And then we also work with the fleet on the level of resilience that's necessary during their operations to cope with the changing environments and to cope with the mission-critical nature of these fleets.

In a way at AMPLY, if you think of it in a simple way, we try to make this look like a solar PPA. We're trying to bring scale and reliability and predictability to the space of fleet EV charging, really in the same way that solar PPA brought that cost to the renewable energy space. And then we look at aggregating our customers to really help them dig into these VGI programs that are starting to be seen.

So if we go on to the next slide, for the purpose of today, I wanted to give a really specific example, one of our customers, and the VGI savings that are possible.

In a very simple scenario, this customer,

Tri Delta Transit, an East Bay transit agency, they started down the path of electrification with four of their buses now being electric, a mix of BYD and Proterra, out of about 60 buses that they hope to electrify over the next 10 to 20 years.

This simple scenario, before AMPLY came in and provided this VGI environment for them, they were running their four charges every night when the vehicles got back and were plugged in. And they were seeing two charges at 50 kilowatts and two charges at 80 kilowatts for a total for 260 kilowatts. That's what the graph along the bottom shows.

Once AMPLY stepped in we were able to do a couple of things. One is use software and connectivity to the chargers to delay the charging to the cheapest time of use rate. And, number two, to spread out that load so that it reduced the demand charge that's on this load. It's PG&E power in this area. We were able to, through this method, reduce their bill by about 40 percent. Plus, we were able to aggregate and take on and provide them with revenues from the Carbon Program from LCFS for about another 35

percent savings. This took their energy costs for these electric buses from about just over $0.40 a kilowatt hour down to right around $0.10 a kilowatt hour, very concrete savings, very well delivered, and just the start, the tip of the iceberg, of what we can all do with VGI and with programs that we can enable through this.

Next slide please.

So I just wanted to wrap up. I'm very pleased to be on this panel. We believe at AMPLY that VGI is a very important part of being able to make private and public partnerships, and also private financing, work for large-scale electrification of these fleets. And we stand here as an EVSP that is out there doing this, has customers, is operational, and is delivering this charging as a service to fleets.

So thank you very much and I look forward to the rest of the discussion.

Carrie? Carrie, I think you're muted.

MS. SISTO: Sorry about that. Thank you, Simon.

Next we'll be hearing from Ed Burgess, who is a Senior Director at Strategen Consulting where he has worked for five years now as a

technical consultant, as well as an expert witness in regulatory and policy forums related to clean energy and distributed resources in 2060. In his current role, he operates as the Policy Director for the Vehicle-Grid Integration Council, which he's representing today. It's a 501(c)(3) organization that he helped launch this year.

So over to you, Ed.

MR. BURGESS: Thanks Carrie. Can you hear me okay? Great.

Thank you, Commissioners and Commission Staff, for the opportunity to participate today. My name is Ed Burgess. I'm the Policy Director at Vehicle-Grid Integration Council, or VGIC. We're a 501(c)(6) trade association launched in January of this year.

Our mission is to support the transition to a decarbonized transportation and electric sector by ensuring the value of EV deployment and flexible EV charging and discharging is recognized and compensated in support of achieving a more reliable, affordable and efficient electric grid. Our members include vehicle OEMs and EVSE companies, such as Honda,

EnelX, Ford, Toyota, Fiat Chrysler, and Connect California. And we work closely with several other supporting companies, including General Motors, Nuvve, Nissan.

And if you can, please, just go to the next slide?

I wanted to being with a few thoughts on why we think it is critical for California to be scaling VGI now. To that end, you know, we've identified five policy goals that we believe VGI can play a major role in, in helping California to achieve.

One is decarbonizing the transportation sector by accelerating EV adoption. VGI can reduce the total costs of EV ownership through lower charging costs and new revenue streams, unlocking new customer value propositions and business models and improving the utilization of public charging infrastructure so those investment dollars can stretch further.

It also supports decarbonization of the power sector by providing essential grid reliability services as renewable resource penetration increases.

VGI can also increase affordability for

all electricity customers by reducing their bills through the provision of low-cost grid services that, ultimately, limit the overall cost to operate the power system. Also by accelerating EV adoption, it increases electricity sales which help to put downward pressure on rates, even for non-EV owners.

VGI can also improve grid resiliency and security by offering a form of backup power, including during wildfire risk events.

And, finally, VGI can foster economic activity. There's already a broad ecosystem of companies participating in California. And we think that this leverages California's strengths in the high-tech industry to advance clean energy.

Let's go to the next slide please.

So I first want to -- I want to talk a little bit about what we see as some of the economic barriers to scaling VGI. And to start, I'll just mention that the compensation for the full potential of VGI services, we recognize, is not currently being realized. But there's a whole suite of options that are being discussed actively through forums, like the VGI Working

Group which you've been participating in on how to change this picture. And so I won't go through all the list of things that we have on the slide here.

But, just to give you an idea, there's a few different categories of things that we think could help. One is rate options. Providing more dynamic rate options to customers will help to scale VGI.

You know, we can make improvements to the existing TOU rate, so we can offer even more dynamic rates than that as well.

We can think about utility programs, including competitive solicitations for things like demand response. We can think about public funding programs.

I mentioned, you know, backup power and resiliency use cases could be a good use of public funding support.

And then, finally, we think there's a role for incentives to encourage participation and market transformation. And that could also include set-asides for other goals, such as equity and resiliency as well.

Next slide please. This is my final

slide.

One thing I also just wanted to point out is that there's a threshold barrier that we see in terms of scaling up VGI, in particular for enabling V2G, and that's around interconnection. While there are today some options for DC-V2G capabilities that could be improved upon, there's currently no viable pathway from an OEM perspective for AC-V2G interconnection. This lack of certainty around interconnection pathways is something that the PUC, we think, should take action on to address now. And, you know, California, in many respects, is lagging behind some of our global competitors in really encouraging this. So we really encourage you to consider taking action to resolve this issue.

VGIC has laid out some of the pathways we think could work for doing this as part of the V2G-AC subgroup that we worked on earlier this year. But we really do encourage Utilities and Commission to think about the role they play in unlocking this potential and keeping the costs low in terms of what it takes to implement VGI technology.

And I think that brings me to the final

slide. And I'll be happy to take questions and join in this discussion.

MS. SISTO: Thanks Ed. I think this last slide, and one of the points you already made, is something we're really hoping to focus on during this panel. It's how do we make sure that VGI service -- the value of VGI service is returned back to the entity that's providing that service and, also, figuring out good paths forward on interconnection and scaling. VGI is an important first step and I think we'll have some good discussion about that at the end of our -- once we get to that portion of the panel.

For now, I want to turn to Michael Cano, who is the Deputy Executive Officer for Goods Movement Planning and State Policy and Programming for L.A. -- Los Angeles County Metro's Countywide Planning Department. So he leads Metro's development of the Los Angeles County Goods Movement Strategic Plan which is multi-modal corridor planning. He also oversees grant applications for state and freight-related programs, project development and multi-modal integration.

Michael created LA Metro's Regional Clean

Truck Initiative and Freight Working Group which brings together key stakeholders from state, local and private entities directly involved with goods movement in Los Angeles County. And he also serves as Metro's representative on the California Freight Advisory Committee.

So, welcome, Michael, and please go ahead with your presentation.

MR. CANO: Well, thank you very much. And it is a pleasure to be here and to be able to be part of this conversation with everyone.

Metro, as you know, has been very aggressive on the transit side in terms of setting some very strong marks and deadlines for transitioning their fleet of CNG buses to electric. We operate over 2,000 buses, of course, and the goal our board has set is to electrify by 2030. And, of course, we're monitoring that ability to deliver, you know, obviously, given the recent issues with COVID-19 sales tax implications, et cetera.

Metro also is looking at transitioning certain parts of the system first, focusing on the BRTs, the fixed guideways for bus service. We have two that we operate on. One is the

Orange Line in the San Fernando Valley where we already are putting in charging stations to electrify that line kind of as our first full step in integrating charging technology and fleets into our day-to-day operations. For buses, we are looking, also, at the Silver Line pretty soon in the future which operates on the hot lanes, the toll lanes on the 110 and the 10 Freeway while running through downtown as well.

What I'm here to talk to you today about is the goods movement sector. And this is actually where Metro, as the regional transportation agency for L.A. County, sees the opportunity to really have, you know, the discussion about electrification and bringing in electrification of the grid, not just for transit vehicles, but breaking through silo and looking at trucks, and looking at other kinds of applications for commuter usage as well.

I've been tapped to do lead the 710 Clean Truck Program and I do appreciate the participation from both of your organizations. And, you know, when we formed a committee, we brought forth stakeholders from the trucking industry, from equity groups, community groups,

the ports, manufacturers of the various trucks and engines, and trying to have the discussion, well, how do we implement the 710 Project's goal of 4,000 near-zero and zero-emission trucks by the year 2035?

This was a programmatic element incorporated into our 710 Project that was added in there through a lot of community engagement and desire to see our project go beyond just a normal highway project to one that includes community-based programs, as well as the electrification aspect by bringing in zero-emission trucks into the future of the 710 operations, which are very heavily freight related and have tremendous impacts on equity communities through air quality and other kinds of impacts.

So when we've convened this discussion, we realized very quickly that the presence of infrastructure to support electric technology is probably the most pressing thing that we can do as a public agency in terms of investment and where we need support from the state on down in terms of providing not just funding but also some vision in terms of how do we put in the kinds of

charging equipment needed on public infrastructure to complement what's happening throughout the region?

You know, we know there's a lot of discussion about the maturity and scalability of electric trucks about when they're going to be going online in large amounts for us to be able to have many purchases. We know CARB is putting forth additional requirements on the percentage of fleet that has to be sold as electric.

But I think the main thing we're hearing is that even if there were electric vehicles that were available today to be used, there are a lot of fleet owners and a lot of small business owners, especially, it the trucking industry that would not use those trucks. And as we're trying to understand that, you know, we have to realize that we're having a voluntary transition from diesel to zero-emission as fast as possible, well above and beyond whatever CARB mandates. So there has to be a sense of, well, what we've heard is reliability of this system. And we've asked the question, you know, where can we participate as a public agency? Because we're not going to get involved, at least from Metro's

perspective, in terms of putting the slow charging facilities at the places where the trucks are stored overnight, or even getting involved with facilities, like the ports of different warehouses, where you might have an opportunity to charge.

So we're hearing that fast charging technology and the ability to deliver reliable charging for opportunity charging and for, basically, providing the sense that, you know, your electric truck will not have any issues in terms of having power. It's probably the most important thing we can do. And with the lead time necessary to do it means that we have to be thinking now in terms of integrating. So if we're talking about scaling and bringing forth this kind of technology into the public infrastructure, potentially Caltrans right-of-ways that have a tremendous amount of truck use, the time is ripe.

But for now, we want to understand and work with you on how we can put forth applications and develop projects that incorporate this technology so that we send that signal that, you know, by the time electric

trucks are coming online, let's say seven to eight years, in massive scale, that our facilities will be able to accommodate them and be able to support their use.

So I'll stop there but I'm very interested in this conversation and very much appreciate hearing the wisdom of both the panelists and the Board Members, so thank you.

MS. SISTO: Thanks Michael. I think that those last couple of points you made really highlight and amplify some of the things that Simon was mentioning about the need for specific types of fleet operators potentially needing more of a bit of a hand-holding effort in terms of transitioning on a voluntary basis. So I think that's something we can touch on more as we move to the discussion.

Next we're going to hear from Taylor Marvin, who works on the Clean Transportation Team at San Diego Gas and Electric Company. He has a master's degree from the UC San Diego School of Global Policy and Strategy. And he's been very engaged in the VGI Working Group. And he's also been working very hard with San Diego to expand the ratepayer-funded infrastructure in

their service territory.

MR. MARVIN: Hi everybody.

Thanks for that introduction, Carrie.

So for anyone who doesn't know, SDG&E is an electric and gas utility in the San Diego region that serves about three-and-a-half-million people. And at SDG&E, we are really interested in VGI for its potential to provide customer, grid, and environmental benefits, along with transportation electrification and, in particular, provide benefits to all ratepayers. Accordingly, we've pioneered some exciting VGI applications in our transportation electrification programs.

Some of you might be aware of the Power Your Drive Program. That is a program that closed construction last year and installed about 3,000 Level 2 charging ports at multi-unit dwellings and workplaces. And that program was actually quite successful at reaching multi-unit dwellings with about 40 percent of the sites in that program at apartment buildings and other dwellings like that.

The Power Your Drive Program, all of those chargers used are VGI rate which is a

dynamic rate that incorporates the day-ahead CAISO commodity price, as well as system and circuit dynamic adders. We've deployed that rate widely to all of the chargers in that program and it's been pretty successful at increasing the uptake of renewables and avoiding charging during peak times when the grid is strained. Customers are able to set the maximum price that they want to charge an application participating in the program and that can avoid charging their vehicles when prices go up due to those system, grid or commodity constraints.

We're also in the process of implementing a new Vehicle-to-Grid Pilot. This was recently approved by the California Public Utilities Commission, along with our Medium- and Heavy-Duty EV Infrastructure Program. And through this pilot, we are going to test the vehicle-to-grid applications for a fleet of electric school buses at local school district. And through this pilot, we'll be able to explore different ways to balance providing services to the customer, like offsetting demand charges and bidding into demand response markets, while also making sure that these vehicles are being able to be used for

their primary purpose which is, of course, as school buses delivering kids to and from school.

SDG&E is really excited to continue exploring these opportunities and believe that, overall, VGI is a very important means of accelerating the transition to clean transportation and providing benefits to all of our customers.

MS. SISTO: Okay. Thanks Taylor. That's helpful background on your programs and how SDG&E is working to already advance some of the VGI aspects and working to improve on what it's already offered in its existing programs, so we appreciate that.

MR. MARVIN: Oh. Thank you.

MS. SISTO: Our final panelist is Phillip Kobernick, who is developing new transportation electrification programs for Peninsula Clean Energy, which is a CCA, a community choice aggregator, in San Mateo County. Prior to PCE, Phillip was the Fleet Manager for Alameda County, which included at that -- during that job, he oversaw the installation of more than 150 EV charging stations and put in nearly 100 new electric vehicles into municipal operations

throughout Alameda County.

So over to you, Phillip.

MR. KOBERNICK: Great. Thanks Carrie. So I might be switching between hats a little bit today, speaking a little bit of a former fleet manager putting EVs into government operations, and now developing EV programs for Peninsula Clean Energy. So I'll start today with a really quick background for folks unfamiliar with Peninsula Clean Energy.

As Carrie mentioned, we're San Mateo County's Community Choice Energy Program serving residential and commercial accounts in San Mateo County. And we're very proud to be 95 percent GHG-free and very quickly on the way to being 100 percent GHG-free.

Because we're a public agency, we use our funds to invest in community programs. And so that includes a $16 million investment in EV infrastructure over the next four years, from pilot testing on Level 1 solution strategies and, of course, working with our local jurisdiction, our cities and county, on REACH Code adoption.

So the reason that PCE is pursuing vehicle-grid integration in our programs, the

context was really in support of our goal of being time coincident with our renewable energy on a 24/7 basis by 2025. So our goal is to be 100 percent renewable for every hour of the day within five years. And so we know that that's going to involve employing multiple different types of strategies to align renewable energy supply with our customers' demand. And so when it comes to electric vehicles, we know that that's going to have to evolve some incentives and ways to encourage our customers to do load shifting.

And so the way that we are starting on this journey with EVs and VGI is in the residential charging area. We have about 250,000-ish residential customers and so we're starting with home charging, residential-based charging. And the way we're doing this is by testing some active managed charging systems. And that's done through the electric vehicle instead of the EVSE or home-based charger, as some other CCAs are doing. And the mechanism of that is through the electric vehicles onboard vehicle telematics.

And a major reason why we are pursuing

this strategy is that we suspected that most drivers in our territory, as well as, I'm sure, many other territories are charging by just plugging in their cars to a regular 110 volt outlet. Nothing smart about that and -- sorry, nothing VGI smart about that. We do think it's a smart strategy because it's a really low cost, low barrier way to plugging in your EV. And that assumption has been verified with some of our data, that a lot of drivers are doing this. So that's why we decided to pursue a VGI pathway that relied on the intelligence within an EV instead of a network charging system.

And there's a lot of value and different costs associated with this kind of strategy that we're pursuing. Shifting charging your car off peak certainly has a research adequacy implication for us. But, really, the main goal here, again, is to build a foundation for one of which will be several strategies to better align our demand with our renewable energy supplies. I really do kind of want to reiterate to that.

And then, also, the thinking behind going with an EV- versus EVSE-based strategy is that, in theory, we think this is a more scalable

approach, especially given that about 40 percent of our customers live at MUDs. And so if there were long-goal solutions that gave an opportunity for managed charging that are connected to -- you know, plugged into a wall or connected to a meter that's not their house meter going go the car allows for more of that. And I can get you more on that later too.

So shifting gears to a little bit of the tech barriers as I wrap up here. Some of the other panelists spoke a lot about what are great solutions that are out there in terms of looking at managed energy and kind of enterprise-level managed energy. All that's really, really important for us.

One solution that we think would be -- we'd love to see more attention on is ways for customers to better share their data with their LSEs; right? So the data that's inherent in their electric vehicles is their data, and right now we're pursuing strategies to go get that data, but there's certainly opportunity for more to be done there to make it easier for customers to share their charging data so the LSEs can utilize that and then kind of figure out how to

do -- you know, what we can do with that.

And I think where we're going in our program, to wrap up here, is we're exploring lots of different ways that this can scale to the EV drivers in our territory. And there are a lot of different rate options that we're also pursuing. You know, what can we be doing to further incentivize drivers to opt into our managed charging program beyond just the TOU rate? And so that could be dynamic rates, it could be bill credits for performance, lots of different strategies that we're pursuing as we do down that.

And I'll wrap up there. Thank you.

MS. SISTO: Thanks Phillip.

And thanks to all the panelists for your introductions. That was really illuminating for me and, I'm sure, everyone else.

I guess I would turn now to the Commissioners to see if they have any specific questions to the different panelists before we move to a more moderated discussion?

COMMISSIONER MONAHAN: I do have a question. And this may be a tough one for many of the panelists, but I kind of come back to the

issue of rates at the beginning, which is how do we create a charging market that is self-sustaining and that is sufficient to meet our charging needs? And will we always need public money? I think, you know, maybe there's an argument that we will always utility money at some, where there can be a demonstrated benefit to all electricity users. But in general, as to the state as we think through, how do we scale? How do we reach our goals and how do we scale? Is this always going to require some level of public investment?

I'm just curious what your thinking is in terms of, you know, can we do it all through rates? If we had a big enough EV market, would that be -- or what would you give, like what advice would you give us, to the public agencies? What would you say? Like, hey, this is what you need to do, you know, this is what you need to do to set off this private investment that will lead to a self-sustaining market?

MR. KOBERNICK: I'll take the opportunity to jump in there. And I'm, certainly, very eager to hear from my fellow panelists.

I would say from our perspective at

Peninsula Clean Energy, we are very much looking to figure out ways to reduce cost for EV installations. And our effort around that right now is focusing on Level 1 solutions for MUDs. So we, eventually, don't have to have massive investments in these types of programs and projects. You know, what are some ways that we can really reduce the cost, you know, to maybe the $50.00 smart port that can be -- or a smart outlet that can be installed in a really cost efficient way for MUDs. You don't need a lot of massive investment to do something like that. So that's a big focus that we're looking at right now.

MR. LONSDALE: This is Simon Lonsdale with AMPLY.

I would say to your -- the question that if you look to the future, as we see it, is there should not be need because the scale in the space we're at, which is often heavier-duty vehicles, we're already seeing this in the electric bus phase where there are transit agencies looking at 40 to 100 buses. And at that scale, you get into the ability to put in solar and battery storage to cost optimize and bring

down the price. And you start to reach a scale of those renewables where the cost is less than grid power. And it could be onsite or it could be near site for that.

So if I look ahead and I look at those areas, and especially in the larger transit spaces, and then coming in the other medium- and heavy-duty fleet space, I do see an ability that the infrastructure will be very cost competitive. The infrastructure will not add significantly.

I think in the near term, as we're scaling up, there is a need for helping with that upfront infrastructure cost to get people over the hurdle because they are trying out new technology and a new charging-fueling paradigm at the same time.

But I think that I echo Phillips point about ideas to standardize and commoditize. Infrastructure, we look at that on the large scale, as well, about how to start to show agencies a standard pattern for putting in charging infrastructure with a known cost to help to drive standardization through the construction piece of this business. But in the near term, I think that the help that's being provided, both

with the Carbon Credit Program, and then with some grants on early pilot programs is really beneficial.

Thank you.

COMMISSIONER RECHTSCHAFFEN: Simon, you -- I don't know if others wanted to respond to Commissioner Monahan's question before I follow up with Simon?

MR. CANO: Well, I just wanted to add an item in there that, you know, I think from our perspective with the clean truck element, as well, I think we're looking for some real tent-pole investments with the ports and along the 710 and just to provide that kind of upfront signal. I mean, obviously, we have a lot more work to do than agencies that are already transitioning, bus fleets, for example, and divisions to accommodate electric buses.

I think the difference of us owning the fleet, I'm not sure on the transit side versus trying to support the adoption of fleets by private owners in the county for the truck side of the equation, are two different strategies completely. And I think that's where I think we're going to need quite a bit of investment and

support in terms of priority projects going in first than then spark some more of the private investment to come in and seeing that there's a larger public investment starting off the discussion.

MR. BURGESS: This is Ed Burgess with VGIC.

I just wanted to say, you know, I think we're, at least as far as the VGI industry goes, which I'll distinguish from the sort of larger market for EV charging equipment and infrastructure, you know, we're still sort of in the early days in terms of the market transformation. So our sense is that, you know, it probably makes at least some sense to have some support, whether that's from public dollars, you know, or not just to, you know, aid in sort of the development of this new and growing sort of technologies and practices that we call VGI.

But, ultimately, we think a lot of those incremental technologies are pretty cost efficient and will be able to provide a lot of value to all customers and, you know, perhaps ultimately can be transitioned into more of a ratepayer-funded scheme, whether that's the rates

of the utility programs or other ways to not necessarily rely on public dollars but to rely on ratepayer funding, you know, through cost effective deployment of VGI technologies.

So that, you know, like I said, we're still in early days and, you know, there's probably a role. And maybe for certain types of use cases that really are sort of more public in nature, you know, we think about the resiliency in that bucket, and also other types of use cases.

So I'm happy to, you know, talk more about our thoughts on this but, you know, I think that we see sort of a transition pathway to really establish the VGI industry as a whole.

COMMISSIONER MONAHAN: Cliff, you want to ask your question?

COMMISSIONER RECHTSCHAFFEN: Well, some of it has been answered by these remarks, so thank you to everybody.

Ed, what did you -- you were, at the very end of your remarks, you were saying if there's one thing you want regulatory agencies to do, is it to simplify the Rule 21 interconnection? I just want to make sure I understand what you were

urging us to do.

MR. BURGESS: Yeah. One of the issues that our members have prioritized and is really, like I said, sort of a threshold issue in terms of allowing for V2G capabilities is to address the interconnection barriers. And that's really in the domain of the PUC right now is Rule 21. And, you know, there are some significant barriers in terms of how the certification process works for distributed resources and, you know, not really having a viable pathway under the existing rules that, you know, require certain third-party certification processes. And that's just a different process than what the, you know, the manufacturers typically go through and isn't really viable for them.

So we've put forward some, you know, possible alternative pathways through our discussions in the V2G Subgroup that went on late last year, early this year. And so that would be, you know, sort of our recommendation, is to take a close look at that and encourage the PUC to act on some of those recommendations.

COMMISSIONER RECHTSCHAFFEN: I think you heard Carrie, who's moderating, explain that's

already on our radar at the PUC. I'm sure we're not moving fast enough and decisively enough for many participants but it is on the radar. And I don't know if Carrie can respond beyond that if she wants to?

MS. SISTO: Yeah. I think the only thing I would add -- sorry, Commissioner -- the only thing I would add is that we're also waiting on industry because I think a lot of the outcomes of that Working Group that Ed was mentioning was that the utilities want any equipment that's connected to their system to be UL certified, which is justifiable and required by the CPUC. And I'm sure there are other strategies to kind of work around it in the near term for small-scale pilots, potentially, but I think the ultimate goal is to have a standardized, a UL certified type of equipment that can be connected to the utility system for V2G systems moving forward.

MR. BURGESS: Right. If I could --

COMMISSIONER RECHTSCHAFFEN: Ed?

MR. BURGESS: -- just quickly respond to that.

COMMISSIONER RECHTSCHAFFEN: Yeah.

MR. BURGESS: One -- the challenge, I think, that the others are facing is that, you know, in some of the third-party certifications, like I said, just aren't really viable for the way the manufacturing process works within the other sector. And, you know, there's extensive testing and sort of internal certification processes that go on within the other sector.

And so, you know, the preference is, at least from our members, to try to find a way that can be a viable option so that, you know, it wouldn't have to go through this third-party process and sort of, you know, give the -- instill some -- the level of comfort that's needed for the utilities to feel like these are -- this equipment is reliable and going to interact in the way that it's supposed to.

But, you know, really, you know, it's, again, we sort of laid out a few different options of maybe how that could work to self-certify this equipment and, you know, we really would encourage you to take a look at that.

COMMISSIONER MONAHAN: I have a question for Simon.

So, Simon, when you were talking about

the business case, you mentioned this idea of solar onsite plus storage. Does that mean disconnecting from the grid or do you mean in connection with the grid?

MR. LONSDALE: No. No. There's definitely -- so thank you. There's definitely a need for the grid. And I think we always have to step back and remember, there are different applications. And, again, we're focused on fleets, and so I'll leave Phillip and Ed, certainly, to residential and the use cases around that. But in the fleets we're seeing use cases, such as transit buses which are not being used overnight, whereas for Michael, he's got yard hustlers and trucks that are in use almost 20 hours a day with just short breaks, so you have to have very varying use cases.

In the transit space in particular, like I said, that's an area where we're already operating at some scale. But solar is generated but it's not generated at the same time as the vehicles are charging; right? The solar is out during the day. The vehicles are charging, primarily, at night because they are mostly out working during the day. And trying to put

stationary storage to store all of that is just way too much. I mean, if you've got a yard of 50 buses, you would need, you know, almost the same size in battery storage. It would be an immense amount of batteries necessary.

So there is a need to be able to have a NEM contract to be able to put power back onto the grid to then bring it in overnight during off-peak rates. So it's definitely a collaboration with the utilities that's needed to, A, help get more renewables into the system but, B, also offset the time variance that can be brought about.

COMMISSIONER MONAHAN: So it sounds like, from your perspective, it's fair to say that what's going to be really critical is to have a plan where there's an optimization plan for integrating with the grid that would include, I think, some -- you know, this idea of onsite renewable plus storage. This is, I mean, this is -- in a way you need a completely different mindset in terms of fleet manager about what it's going to take to fuel their fleet versus just today's, you know, just put into a refueling station, get the gas or the diesel, and off you

go. I mean, it's a completely different mindset. And so --

MR. LONSDALE: I think --

COMMISSIONER MONAHAN: -- just this --

MR. LONSDALE: -- I think that it's not just a mindset but the efficiency that is possible through digitalization of the grid at the edge like this --

COMMISSIONER MONAHAN: Um-hmm.

MR. LONSDALE: -- really leads to some massive efficiency improvements over today's, you know, fossil fuel. And so we can, you know, in (audio distortion) -- fleets of vehicles without requiring new substations to be built.

And so this -- I do agree with you, Commissioner Monahan, that the grid integration is absolutely critical for these amounts of power. Otherwise, you would step in. And, you know, LA Metro was one of the first ones to put a stake in the ground and say, you know, we're going to electrify 2,000 buses, and it caused ripples throughout all the utilities and the districts around how to do that.

But, you know, what we're seeing as we're moving into this more steadily now, the 40 to 100

vehicle scale and looking for me, is that with grid integration, with some innovation from the utilities, as well, as the utility in L.A. that DWP is now offering some battery through their utility program. And that can be, you know, another way of helping the economics to get into this space.

COMMISSIONER RECHTSCHAFFEN: Simon, can I ask you a two-part follow-up question, which is what I take it, since you're customizing so many things about how the fleets operating, maximizing different income streams, the -- for each site the price you charged to each customer will vary based on their particular situation? That's the first question.

MR. LONSDALE: That's correct. That is correct. The price varies based on the application they need.

COMMISSIONER RECHTSCHAFFEN: Yeah. Okay. All right, I'll pause there. I'll let someone else jump in.

MR. KOBERNICK: If I could jump in with a quick comment on -- based on something that Commissioner Monahan said in relation to Simon and AMPLY, it's a mind shift for fleet managers.

I really want to echo and emphasize that. You know, fleet managers are pretty used to fuel volatility on a month-to-month basis and a year-to-year basis. When looking at diesel and gas use fuels contracts and things like that, you build in some margins here.

When you talk about switching to electricity and you have -- the prices are varying, you know, two or three X throughout a day, and then you have demand charges on top of that, it's a whole new way of looking at fuel management. And from my experience, talking with at least the municipal fleet managers, there are some folks that are way out in front and then everyone else is not there yet.

And so having systems that are kind of inherent into how you do VGI are also just the new fuel management system that fleet managers need. You know, they have it for gas and it's being created for EVs now, managing hundreds of the EVs onsite and thinks like that. So I think just inherent in building something that works for VGI just works for how fleet managers, you know, will be thinking about fuel management for electric vehicles.

COMMISSIONER RECHTSCHAFFEN: Well, to that -- somewhat related to that point, maybe I could ask to what Phil said, and Simon, I could ask you this question again, you're presenting plans and operational management approaches that save the fleet operators money compared to uncontrolled or unmanaged charging, so they can see a benefit. And you gave that example of the benefit you -- in one of your, you know, one of your first slides.

Are you -- are these fleet operators who are already committed to going electric and it's just a matter of optimizing their charging behavior so that it's done in the cheapest way, are you talking with managers who are saying, well, I don't know, I'll do it if it's more -- if it's cheaper to go electric, and then you're coming up with a plan that's shows how it could be cheaper or is that -- are we not there yet with economies of scale and other benefits that you can bring in to show a really cheap charging plan?

MR. LONSDALE: Very interesting question. If I site the example I gave of the Tri Delta Transit, they had some electric buses. They know

that there's a mandate here in California for transit buses to go zero-emission and so they started down that path. They very much found themselves stuck because of the complexity of fueling these vehicles and the process being different and impacting the way that they managed their depot and they managed their vehicles.

So bringing in an EVSP helped -- (audio distortion) -- and also provided motivation and confidence that the vehicles were charged. And they understood how far they could travel each day. And that has given them confidence to continue on the path of full electrification.

And we are seeing that same thing with other customers. There's another good example at Solano Transit, SolTrans, started with four buses and are now looking at their pathway to the full 75 vehicles being electrified because of gaining confidence in the fueling fees. That was the missing piece, how to provide that infrastructure and how to fuel it such that the vehicles work, you know, every day, day in and day out?

Another vertical, but I think it's still earlier, is still more of that pilot phase for vans and trucks.

And it looks like Michael wants to kind of join in on this as well. I'll hand it over to you.

MR. CANO: Okay. I'll just make a brief comment. Thank you.

One of the things that we've heard from our Operations Team is that, you know, the placement, our lines are so long that, you know, we can't put the entire pressure on providing route mileage for electric vehicles for buses all on the bus technology itself. I don't know if we're going to get to, you know, a 200-mile charge, for example, and then be able to charge it fast enough where you -- where the cost is then transferred over to having more buses available so that you have the ability to swap buses, as opposed to one bus running all day on a fleet.

So I think the location and the access to charging along routes for Metro, specifically given how long our routes are, will be a tremendous cost savings for us versus a paradigm where have to have more buses in our fleet. Because once a bus goes out for a few hours it's got to come back and charge before it can go back

out, as opposed to today where our buses can go, you know, most of the day and not have to worry about that. So I think there's different tradeoffs we're going to be looking at, at Metro, in terms of that.

On the truck side, I would say that I think it's the access and reliability and speed of the charging that's more important than the cost of it, just given the amount of fuel and usage of it there. I think that's where we're hearing a different kind of sensitivity in terms of what they're looking at. We haven't heard much about the cost of charging yet from our drivers we talk to.

MR. KOBERNICK: And I'll add in another quick thing to build on those two points too.

When it comes to total cost of ownership, too, there's a lot of different people doing it in a lot of different ways. But if you really take a wider view on how costly it is for fleet managers to run a gas use fuel operation and you look at underground storage tank regulations and complying with those, and maybe the need to upgrade fuel tanks, if you are a municipality and you have a 40-year-old fuel tank, for instance,

the overall total cost of ownership really starts to become more interesting when you really, really think about the entirety of your operations and what it would take to move the whole thing to all electric.

And so adding a bunch of new infrastructure is always going to be expensive. But if you really factor in the total cost of maintaining and storing fuel tanks onsite and things like that, then you can really start to kind of see a bigger picture there.

MS. SISTO: Okay. Thanks.

If the Commissioners don't have any other questions, I might take Moderator privilege to pose one to the panel.

I think just building off of the last conversation here, I think it would be helpful to have a bit of a conversation about what mechanisms or how we can -- especially, you know, I oversee and analyze and provide guidance to the decision makers on publicly-funded programs that are proposed by the utilities -- so how can we best make sure that those funding efforts are focused on advancing VGI?

We heard this morning, there are a lot of

concerns about having very specific requirements for program participation. So it sounds like, potentially, maybe not having like narrow requirements isn't the best solution. So maybe just a conversation about how we can make sure that the public funds are really going towards programs that advance different vehicle-grid integration strategies and, potentially, could be something like there's higher funding availability for more highly capable and reactionary resources or something like that?

But I'm just interested to hear folks talk about what types of programs and parameters they think would be most beneficial to see in public funding offerings going forward.

I'm happy to call on someone first if that's helpful. Maybe I'll ask Ed to start the conversation.

MR. BURGESS: Yeah. Thanks Carrie.

Well, I think, you know, one place to look is going to be the VGI Working Group's report which will be coming out imminently. And, you know, there's no other work to sort of identify different types of high-value use cases. But I think, you know, from that, we can use that

as sort of a launchpad.

And we, actually, our group, has been doing a lot of thinking over the last few weeks, really, about what would it look like to develop sort of a portfolio of VGI programs? And, you know, these could have varying levels of support, you know, through ratepayer funding but it would be, you know, trying to sort of figure out a good balance of different, you know, more advanced to less advanced use cases and different market sectors and different funding mechanisms, you know, everything from competitive solicitations to, you know, some maybe upfront incentive-style approaches to more just rate, you know, options.

So, you know, we've been thinking about this. And, actually, we've been sort of kicking around sort of a straw proposal idea of what that portfolio might look like. And we're not sort of quite ready to share that publicly yet but I think we will be soon. And we'll have to sort of have that conversation with this group and others as we sort of get further along.

MR. MARVIN: I think to add to that, something that's really important that we're considering in VGI is, we all know it, but

remembering the primary goal of electric vehicles is to provide transportation. And I think it's really important that when we're designing VGI strategies, bearing in mind that they can't be too complex, they need to be accessible to customers, and often times figuring out a way to make that so can be difficult.

Like I think one of the reasons that the VGI rates we have in the Power Your Drive Program has worked well is it's not just a dynamic rate but, also, we have this whole ecosystem of making it accessible to drivers where we have a building mechanism that makes it straight forward. Drivers are directly billed in many cases. We've installed the infrastructure so that when you're restricting the amount of time that the drivers can charge, they're still getting a sufficient charge that makes them happy. And bearing all that in mind when designing programs, I think, is really important because the goal at the end of the day isn't VGI for its own sake, it's transportation electrification.

MR. BURGESS: Yeah. I just want to echo that and say that, you know, one thing that we think may be actually sort of a weak spot in the

VGI Working Group's efforts is a little bit of a lack of focus or emphasis on just the sort of customer experience or customer acquisition side of things. And we think that, you know, perhaps that deserves some additional focus as we go forward here about would it -- what do we need to do to sort of enable customers, EV owners, EV providers, to really adopt VGI technologies and practices?

And sort of, you know, there's a lot of cool fancy things we can do, you know, within the realm of VGI, but to actual get this to be adopted at scale, you know, I think we need to think more about that program design. You know, what's the best way to get customers engaged and, actually, you know, perhaps even provide some incentives for that to happen?

So that's something that I think we would want to also incorporate into our sort of strong proposal that I mentioned earlier about, really, what is it going to take for a customer acquisition, you know, to be able to have them leverage their vehicles to provide these services?

MR. CANO: Yeah. I'd like to add that,

you know, there's a lot of different facets to this. Obviously, if different fleet owners have facilities or things they want to upgrade, that's something out of our hands.

But I think from the public perspective, you know, we can't have a scattershot approach to this. There's going to have to be coordination and some kind of strategic discussion amongst various jurisdictions that touches -- I think in L.A. County, for example, you know, Metro and Caltrans and the ports are going to have a discussion about, okay, where do we strategically place key pieces of infrastructure and how do we prioritize that so that when we're coming to various commissions and funding opportunities, we're able to identify that this is, you know, number one, number two, number three, and this is part of our larger plan? Because if we don't do that, we're going to, I think, waste a lot of money and have, you know, different projects undercutting each other's value.

So I think there needs to be a lot more coordination and strategic programming on our side. And I think that's one of the things we're really focusing on at Metro is trying to convene

our various partner agencies to look at this holistically, as opposed to the ports do their thing and then we're doing something else out in parts of the county, and then that doesn't really translate to the truck drivers saying, okay, that covers me, what I need to be able to invest in and operate a zero-emission electric truck.

MS. SISTO: Thanks. That was a great discussion. And I appreciate your -- all of your insights. I think that was helpful for me at least. And I think we have to transition to attendee questions. But I wanted to like really strike a bold underline of how Michael ended there. I think a lot of the really needed next steps are improved coordination across the different public programs and in terms of data collection and sharing data and really coordinating our strategies so that it's a consistent signal to really emphasize what we're looking for from VGI across the board.

So with that, I'll turn it over to Jonathan for panelist Q&A.

MR. BOBADILLA: Thank you.

MS. SISTO: Oh, no, I'm sorry, attendee Q&A.

MS. RAITT: Yeah. Oh, and sorry, this is Heather Raitt. I'll just jump in for one second.

Jonathan, want you go ahead and read -- we have a special panelist dispensation for -- we'll read Stacey's question first if you don't mind. Thanks.

MR. BOBADILLA: Yeah. Stacey asked, "Can the panelists comment on how they see TERPA helping their approaches, especially the idea of focusing on the energy delivered versus the number of vehicle ports?"

Did that audio go through?

MS. SISTO: It did. I know that some panelists are hesitant because they didn't see the presentation until like this morning, so --

MR. BOBADILLA: Okay.

MS. SISTO: -- they might not have a lot of feedback on how did. But I'm happy, if anyone wants to speak to that, I'm -- or maybe it can be a follow-up conversation?

MR. BOBADILLA: Got it.

MR. BURGESS: Yeah, I haven't given it much thought and just saw that today, so I don't have -- I don't have a response right away.

MR. BOBADILLA: All right. And with

that, I'd like to move on to Zoom Q&A questions.

Michael Nicholas asked a question or Phillip. "Can you comment on how you use the vehicles as the way to implement VGI? Are the signals passing back and forth? To what extent are OEMs ready for vehicle-side VGI?"

MR. KOBERNICK: Yeah. So the way we're doing it is by -- we are using a third party to connect with the vehicle's connected car apps. So right now the vehicle has to be capable of doing that. And it's sort of we're starting small and then building.

It's not so much a back and forth per se. Basically, what we're doing is we're overriding any charging schedules that a driver may have already set. And we're providing an algorithm on -- that takes over their scheduled charging. So we're getting data from the vehicle and then -- including state of charge. And then we're getting some driver inputs, like what their rates are and things like that.

So a back and forth would be like if the car comes in totally empty, right, it's just basically got nothing left in it, we see that from the car, we're going to start charging it to

a minimum amount and then move to off-peak.

So that's like one example of back and forth but it's really data coming from the vehicle telematics that it already coming to us and then we apply charging information back to it to do active managed charging.

I can take that offline if you have more technical questions on it.

MR. BOBADILLA: Thank you.

And then a question from Michael Nicholas and it's directed for Taylor. "What is your opinion of vehicle-side VGI as a solution?"

MR. MARVIN: So I can't speak to the technicalities but I would say that we are very interested in low-cost solutions and low-cost information technology. And like Phillip was alluding to, where vehicle telematics can provide that, that's something that's very exciting.

MR. BOBADILLA: Thank you.

And I believe that's all the time we have for Q&A.

MS. RAITT: Great. Thank you, Jonathan, and thank you to our panelists. And thank you so much to Carrie. That was really helpful.

So we would like to just do a quick poll

as part of our efforts to get some feedback and learn more about how to work best in a remote environment. So this is just to get a little feedback on Q&A. So we just wanted to find out if folks are liking it, if it's okay, if it's a disappoint or you don't like it. And we'll just leave the poll open for about 45 seconds, give an opportunity to respond.

(Whereupon a poll is taken via Zoom.)

MS. RAITT: All right. All right. Well, we can go ahead and close it. So it just gives us a little bit of a snapshot. It's certainly not a scientific poll but it looks like most people who responded like it, so that's great.

So with that, we can go ahead and take a short break and we will come back at 3:15. I encourage everybody to stretch a little bit. And we'll have the hold music on and we'll be back promptly at 3:15.

(Off the record at 2:56 p.m.)

(On the record at 3:15 p.m.)

MS. RAITT: Hello. This is Heather Raitt. So it's 3:15, so we'll go ahead and resume the workshop.

So we'll move on to our panel on EV

Charging Scale-Up: Potential New Business Models for Private Investment. And the Moderator is Tim Olson from the Energy Commission. And we'll have a short series of presentations, followed by time for discussion.

So, Tim, please go ahead and start your panel.

MR. OLSON: Okay. Very good. Hello. Hopefully everybody can hear me.

MS. RAITT: Yeah.

MR. OLSON: Good afternoon. Welcome to this next panel. My name is Tim Olson. I'm with the Fuels and Transportation Division at the Energy Commission.

So this is a sum-up of not only today's workshop but some of the things that have gone on before from May 20th and May 21st IEPR workshop, the June 11th workshop, June 22nd, and then today. And part of this is all those workshops were really focused on the progress of zero-emission vehicle growth, market growth, both electric and hydrogen, and a look at the existing incentives, regulations, programs that support the goals achieving 5 million ZEVs on the road by 2030, including light -- not only light-duty

vehicles but medium- and heavy-duty. And we heard earlier testimony about the existing electric vehicle charging programs through the IOU rate-based investments, the settlement funds, and then the Energy Commission, and there are other -- Energy Commission, ARB, and other agencies that deploy, mostly, grant instead of funding.

We also heard testimony throughout several of those workshops about this gap, this -- we don't -- we aren't -- we have a shortfall on achieving the investment -- or expected shortfall on achieving the investment to meet those 2030 goals.

And so with this in mind, we organized this last panel of the day to delve into the potential to increase private investment in ZEV infrastructure, understand the formation and evolution of new business models, and also seek insights about how to configure or reconfigure existing programs or proposed new initiatives to boost private investment to meet our goals.

I'd also like to mention that this panel session is consistent with objectives of another parallel Energy Commission proceeding to explore

strategies to attract private investment in a whole range, a broad range of clean transportation options. I will present some initial findings from that proceeding after the Q&A of this panel.

So we have, again, another distinguished panel of experts. And I will introduce each in the order of their presentation.

And the first is: Anand Rangarajan, who is Managing Director of Cambridge Capital out of New Jersey; Stacey Reineccius, CEO of PowerTree; Abdellah Cherkaoui of Volta; Marc Monbouquette of EnelX, this company was formerly eMotorWerks and bought by Enel Italian Utility; and Rajiv Shah of FreeWire.

So thank you, everyone, for joining the table today. And let's proceed with Anand as the first speaker.

MR. RANGARAJAN: Okay. Can you hear me?

MR. OLSON: Yes.

MR. RANGARAJAN: Okay. Thank you, Tim. I am in the happy company of people with difficult last names.

I just want to start by thanking you and the Commission to inviting me. It's a privilege

for me to be here. I've been asked to talk about mobilizing private sector investments and building out EV charging infrastructure in California.

The specific questions are: Can government funds, can they be levered with private investment? What are the elements and opportunities to bring in private investment? This is a hefty subject so my presentation here is just a high-level analysis based on my own observations and experience.

Just to set the context for my presentation, I just wanted to say that I got my start in the renewable energy business about 30 years ago when I was at MIT. Throughout my career I've worked quite a bit in deploying behind-the-meter solar systems, microgrids with storage, and so on, particularly at commercial-industrial facilities throughout the country really.

My experience in the EV space is, in a way, somewhat limited but just to give you a background, it's about 30 years ago, I was part of a working group with the big three automakers, Chrysler, GM and Ford, where we were looking at

EV charging infrastructure implications, particularly with solar. And we worked alongside with some of the independent system operators and so on. (Indiscernible.) but the issues that we were grappling with 20 years ago or 30 years ago are still present today.

So with that kind of just a little bit of a background about me, I'd like to have the next slide please. Okay.

Basically, I have a couple of points that I want to emphasize in this particular slide. We are estimating, and it's only a rough order of magnitude, that the EV charging demand is 4,000 megawatts. And this is -- this could be wrong. There probably are better estimates of what the charging demand requirements are likely to be. But this is -- these can be seen again as a total capacity of 80,000 megawatts. So on the face of it, you know, you would think that the demand capacity issues are not really an issue.

So the important question, really, at least from my point of view is: Is this capacity available in the right places where it is needed? You know, EV charging infrastructure is going to be built out wherever it's needed. And the

question is: Is can this capacity be made available for the requirements of EV charging? And, specifically, that has to do with the distribution infrastructure and what are the constraints within the distribution infrastructure? This needs to be looked at very closely.

The second observation is that CEC estimates a funding gap. You know, they've identified some numbers. According to me, according to us, you know, we think it's about $4 billion but, again, it's only a rough order of magnitude. And this may not even include some of the make-ready costs and soft costs that earlier panels discussed, such as interconnection, permitting and whatnot.

So I just want to lay out some of these issues. First, starting out with -- can I have the next slide, please, with the distribution infrastructure?

So in the distribution infrastructure, which is where all EV charging stations plug into, there are a lot of bottlenecks and choke points. You know, it's in the transformers, substations. It's in the transformers at the

different locations. And so this is a bottleneck that, somehow, needs to be addressed, you know, both in terms of engineering and planning and budgeting and, finally, the investment.

The business-as-usual model puts this obligation, really, to remove these impairments or infrastructure bottlenecks on the IOUs, on the distribution companies, which have their own set of issues related to ratepayer impact. And usually those kinds of things, and interconnection studies and things like that, have a long planning cycle, they have an uncertainty regarding what the capital investments need to be, and so on.

And this kind of work, make-ready work, if you will, is usually funded through grants and, you know, through IOU cost recovery programs and local government budgets. And sometimes it's even done on the balance sheet of the companies, of host companies that are proposing to install these things. Now that's where we are, you know?

Now this, you know, I've highlighted some of the impairments. This takes money and time, you know? And who comes up with this early stage risk money, number one, you know? Because the --

you don't even know if the project is viable, who's going to come up with the money, and it's a long difficult process to even figure out, you know, to make the ready -- the project ready for construction.

And then when you get all done there are issues related to owns all this upgraded infrastructure. Is it the electric company? Is it the host who paid for it? Blah. Blah. Blah. So it's not really amenable to a private investor coming and taking a look at the process and saying, okay, this is a great project, I want to invest in it because it's got great returns. There is too much and, in fact, are even hard to understand.

Can I have the next slide please?

MR. OLSON: Anand, this is Tim Olson. Can you -- we're going to get short on time. Can you kind of summarize this model? And then I will bring back or we'll bring back in the questions to you some time that you go through some of the detail of this. Is that okay?

MR. RANGARAJAN: Okay. Will do. I'll go through it very quickly.

So the next slide here is really a new

way of doing this. It's not really a new way, it's just a different way of doing it and, actually, a lot of people are doing it, and that is to shift everything to behind-the-meter rather than in front of the meter.

And, basically -- if you can go to the next slide here? Okay. Can you go over to the next slide please? Yeah. So sorry. Did I -- maybe you need to go back. I'm sorry. I made a mistake here. Can you go back one? Oh, it's missing a slide.

Anyway, the idea is to move everything to behind-the-meter. And when I say everything, what I mean by that is if we can improve onsite solar, as it was discussed, along with battery storage, and possibly even onsite RNG generators, that is renewable natural gas generators, you remove a lot of the problems associated with interconnection issues. These are typically called non-wired solutions. And I won't go too much into what the technologies are but it's, essentially, available commercially (indiscernible).

MR. OLSON: Anand, we lost you there. Hello, Anand, are you there?

MR. RANGARAJAN: The next slide.

MR. OLSON: Anand, your audio is breaking up and we can just barely hear you.

MS. RAITT: Tim, this is Heather. We may just need to move on.

MR. OLSON: Yeah. Okay. So, Anand, I'll come back to you. Maybe we'll try to work behind the scenes to figure out how to get your audio back in place, so we'll go on.

MR. RANGARAJAN: Can you hear me now?

MR. OLSON: Yeah. Anand, we're going to move on to the next speaker. And I will bring up some of these items in our Q&A, so to give you some more chance to discuss that.

So let's go to the next presentation, Stacey Reineccius of PowerTree.

Go ahead, Stacey.

MR. REINECCIUS: Can you hear me all right?

MR. OLSON: Sounds good.

MR. REINECCIUS: All right. Great. So I want to go through these slides fairly quickly. I'll invite anybody who wants to dive into more detail to look at the decks and to, you know, feel free to contact me directly or ask questions

when we get to the Q&A.

I recall Commissioner Rechtschaffen commenting to me one time a few years ago that there was no way that the government of California could ever come up with enough money to fully fund what was necessary, and that we had to find a way to align the interests of those who have the capital and access to capital with the needs of the community and the state.

Next slide please.

So one of the components that has been neglected for years has been the participation and the access by renters, i.e. non-property owners. One of the owners of a solar company that I worked with, oh, I don't know, 15 years ago, made the point that going after single-family homeowners and commercial property owners was the low-hanging fruit because the beneficiary and the decision maker were all the same. Tenants and renters, although they comprise about 40 to 45 percent of our total population, don't fit that definition and, as a result, have been neglected by both installers and policymakers with very small exceptions.

Next slide.

In our major urban areas the renters actually comprise the majority of the population or very significant minorities and, yet, have received, whether through common meter support or other, less than five percent of the total solar that's been installed.

Next slide.

And while we're on track to reduce 50 percent of the petroleum usage in the state, we're not going to achieve that, nor goals beyond that, unless we activate that portion of the population, which is currently blocked and un-incented.

Next slide.

We did a study some years back when I was with the California Energy Storage Alliance where we engaged Strategen Consulting to analyze the impact of that 50 percent reduction in gasoline consumption and what that would mean in moving the 81 percent of every gasoline dollar that's spent that leaves the state of California back into the state. The summary of that and the full report was included with my filing of comments in this proceeding -- or in this docket, excuse me, and it worked out to about $51 billion per year

in new money that came into the state by displacing gasoline, of which about 40 to 42 percent of that comes from renters.

Next slide.

And we know, both from our own surveys and studies done by the UCLA Luskin Center that about two-thirds of the potential EV drivers are renters and, yet, we're seeing the same situation where 93 to 97 percent of the current actual buyers and drivers, excluding buses or fleet vehicles, are single-family homeowners, meaning that we're setting up and actually repeating the lockout of those renters who we vitally need to participate in this transition.

Next slide.

One of the challenges, the key challenges of multifamily that we have to address, is the current policies and the idea that multifamily is the same as single-family and it's not. Multifamily is inherently a shared resource for multiple families.

This is a study that we did analyzing the turnover rate and the probability of ownership of an EV from a multifamily owner's point of view to say that if I invest in fact, what's the

probability of that dedicated charger, i.e. one charger for one apartment, actually being utilized in five years? And because of the turnover of tenants and the differing rates by different sizes of properties, you can see that at the end of five years larger to medium properties have an extraordinarily low potential for utilization unless there's shared access. And that is not the way that our current policies are implemented.

Next slide.

So to understand how to bring capital forward, we have to understand how big that might be, how much capital there might be. And we have to also understand that multifamily is a different type of property. It's a hybrid between residential and commercial. You have residential rental durations but you get a commercial treatment in tax and valuation.

And the key for any multifamily owner is their equity value because that is their stock. That is what they target. And that value is determined by their annual rent divided by what's know as the capitalization rate or cap rate. And, essentially, in typical multifamily

properties, whether it's San Francisco or Sacramento, for example, that capitalization rate can range between about four percent and five percent, meaning that if you have one dollar of income as rent and you divide it by that amount, you have somewhere between $20.00 and $25.00 in equity. That equity can then be borrowed against or used in the sale or refinance of a property.

And so if you can generate value from EV charging and from the associated components necessary for EV charging in a way that appears as rent to the property owner, you get a tremendous multiplier in value which unlocks capital.

So moving on --

MR. OLSON: Stacey, Tim Olson again. We're going to have to wrap up. Is there a way for you to summarize? And then we'll try to -- you have a lot of meaty stuff here and we'll try to get this into someplace in our Q&A.

MR. REINECCIUS: I'll leave it for people to read the numbers but there's about $600 billion in potential value for equity that could be activated.

Next slide. Next slide.

To get that, we need to streamline. So some key things which align well with the earlier TERPA comments is we need to shift our focus from ports to vehicles enabled and miles enabled. And here are some specific bullet points on policies and adjustments that could be made to streamline this process in multifamily. And I won't go through each one.

Next.

And then we also need to accelerate multifamily because multifamily is way behind the curve. And, again, I won't dive deep into each of these but I would invite comments and questions.

And then, finally, next slide. If those suggestions for streamlining and acceleration can be accomplished we'll have a win for tenants who will have access to EV and solar savings. We'll have a win for owners who retain tenants and gaining new equity value and we'll unlock their access to capital to invest in these technologies and these capabilities. And we'll have a win for the communities who gain cleaner air and increased local economic activity. And we get a win for the state programs. And we get, unlike

other programs that focus on giving money to the utilities, we wind up with increased property tax revenues with help with the general state budget.

Thank you.

MR. OLSON: Thank you, Stacey.

Our next speaker is Abdellah Cherkaoui from Volta.

I hope I pronounced your name correctly, Abdellah. I apologize if I didn't.

MR. CHERKAOUI: You have, Tim. It's perfectly fine.

I'm starting my video here. And I'll try to use my five minutes efficiently because that's what we do at Volta. We, essentially, build electric vehicle charging infrastructure that makes an impact. So there are three points to what we do.

The first one, and I won't even, essentially, show it, I think, unless Heather allows me to share my screen, then I can show one single slide. We have a model that has started about ten years ago with a simple thesis. We chose let's provide something else to real estate owners for an amenity that will bring and provide a service to end users, end users being EV

drivers, and that will drive adoption by visibility.

So if you all -- in the call, I think there's about 147 participants -- have not seen a Volta station, that means you're not driving an EV or you have not been at the right places for that.

Number two, that model where we, essentially, monetize advertising and visibility front and center where we're deploying infrastructure, thanks to a very different monetization model, drives an unbelievable amount of utilization, visibility and, really, adoption, as well, and we show numbers and, in fact, the load.

So to come back to the previous panel, it's really interesting, if you don't do EV charging infrastructure in the right places, then the load that you get is insignificant and, therefore, the monetization through that load does, actually, not matter. It's sort of the hope for the next eight years.

And the last piece is as we have been, essentially, developing what we call EV Charging 2.0, where we map the whole city -- because we

are not selling just hardware to one side and another side. We actually go and look at the sites where people go, move, how they move. And then this is a really key important piece, which is: How do we plan for that infrastructure to be capital efficient, to be capital effective to, essentially, drive impact for every dollar, whether it comes from the public, ratepayer, taxpayer or, in fact, and that's what we do at Volta, coming from private capital with a two orders of magnitude revenue for every dollar invested, even though those dollars invested are high.

So that's, essentially, what we do and I'll stop at that. I hope I haven't passed my five minutes.

MR. OLSON: Thank you, Abdellah. Very good. Thank you for the short -- for the staying within your time frame there.

Our next speaker is Marc Monbouquette of EnelX.

Please proceed, Mr. Chairman.

MR. MONBOUQUETTE: Thank you, Tim.

Thank you, CEC Staff and Commissioners for having me.

With increasing concerns about rising ratepayer costs, the limited reach and competing priorities for the state's existing funding sources, which was even the case before COVID-19, and the current post-COVID need for green stimulus dollars to help the state emerge from the economic downturn, we must consider new investor models and sources of private capital to rapidly scale the buildout of EV charging infrastructure if the state is to meet its clean transportation goals.

Next slide.

Quick note on EnelX eMobility, and we are a leading provider of EV charging hardware and software solutions across many customer segments, vehicle types and use cases.

Next slide.

I'd like to start by covering some guiding principles that drive our recommendations.

First and foremost, the provision of supporting infrastructure and services from utilities and third parties needs to be guaranteed, predictable, and streamlined.

Next, we need to think outside the box of

traditional funding sources and investment models. I'm primarily referring here to ratepayer funding and state funding that is dispersed through the form of upfront rebates or grants. Now please don't construe this as EnelX advocating for a rapid transmission away from these things, far from it, but we can no longer consider these as the only way to fund and invest in charging infrastructure.

Finally, the state needs to maximally harness the value of VGI, primarily through market approaches and by enabling incorporation of monetizable VGI value streams into infrastructure financing while utilizing open standards to ensure statewide interoperability. This must be considered a first principal for EV infrastructure investments if the state is to meet its transportation goals in the most cost effective manner.

Next slide.

So given these principles, we invite consideration of the following recommendations to transform California's investment landscape for EV infrastructure.

First, we believe that tariff solutions

should serve as the cornerstone to accessing infrastructure on both sides of the meter. Tariffs establish a standardized, always on pathway for EV infrastructure service that guarantees customer access to TE infrastructure in a timely manner and responds to actual, instead of forecasted, market demand for EV charging. Tariffs can establish EV infrastructure and VGI provision as core functions of utilities and third parties and can move beyond the need to continually allocate or approve funding and determine priority segments for investment. Most importantly, tariffs help make infrastructure funding predictable and bankable.

Next, site-specific cost recovery for utility infrastructure provision, which is more or less synonymous with on-bill financing, should be established as an option to divorce utility capitalization of infrastructure from ratepayer funding. This mechanism allows for utility rate basing of infrastructure inclusive of the EVSE, ongoing payments via customer bills to pay down the upfront cost of infrastructure, and the transfer of ownership from the utility to site

host once that infrastructure is fully paid off. This allows for all relevant funding sources to be applied to ongoing payments, including participant payments, state and local funding, LCFS or VGI revenues, or ratepayer funding when it's deemed important to meet state policy goals.

Another big source of private capital, which is encapsulated by our third recommendation, would be the creation of a state level, public-private EV infrastructure fund with a loan guarantee to attract patient institutional capital to finance EV infrastructure. This would be similar to the approach of the rooftop solar industry when they launched the solar leasing model by securitizing net metering payments for institutional investors. The challenge here, of course, would be to guarantee utilization and payment. But with the state backing and loan guarantee, this would help mitigate that concern.

Finally, VGI services should be monetized via existing or emerging market pathways and used to supplemental the funding streams and financing models discussed here. A great example of this is having a tariffed option for customers or site hosts to elect a certified load management

solution. I think this is similar to the first presenter's presentation for a non-wires alternative to interconnection whereby customers could avoid costly upgrades that might otherwise be entailed by interconnecting high-capacity EV charging load.

Another example is to think about how VGI value could -- oh, sorry about that, that was my own timer -- how VGI value could offset the payback costs for utility capitalized in fact, for instance, by establishing a performance incentive for permanent new midday EV charging load that helps avoid solar curtailments.

So forward two slides. I've covered the second to the last slide already but I appreciate the opportunity to comment and look forward to the discussion.

MR. OLSON: Thank you, Marc.

And our final speaker for this panel is Rajiv Shah of FreeWire.

Are you ready to go, Rajiv?

MR. SHAH: Yeah, I'm ready to go. Thank you. Thank you so much, Tim.

And thank you, Commissioners and CEC and CPUC Staff in attendance, for your continued

support of the buildout of EV charging infrastructure across California.

I serve as Director of Regulatory Affairs at FreeWire Technologies where I oversee our policy, regulatory, and sort of legal matters, so that's many hats.

Next slide please.

So just a little bit about FreeWire. The company was founded in 2014 with a vision of our CEO to provide electrification beyond the grid. And I was really enjoying Anand's presentation and the slide he had just put up about sort of behind-the-meter solutions and sort of avoiding some of the distribution constraints and grid constraints because that's exactly what our technological solutions are attempting to solve for.

The Mobi EV Charger is, actually, you know, a technological solution that kind of speaks to what Noel Crisostomo included in his earlier presentation and his remarks about charger utilization. It's a mobile EV charger that was our first generation product that has 80 kilowatt hours of integrated energy storage and electric drivetrain, and has been deployed in a

host of workplace and -- well, primarily workplace and fleet charging settings, and increase charger utilization in its application from one to two charges a day to serving six to eight vehicles from a single Mobi in a day.

And the success of the Mobi led to a lot of interest from some of our investors in a study that we conducted in 2018, in partnership with BP, where we demonstrated sort of a battery integrated fast charging product, and the success of that study has led us to where we sit today. We're on the eve of launching a new product in the Boost Charger.

Next slide.

So the Boost Charger is a -- it builds on the battery integrated sort of concept of the Mobi. And it reduces installation and ongoing costs, those grid infrastructure upgrades that are especially problematic for gas stations and other sites with a small sort of electrical footprint. And it provides 120 kW fast charging capabilities via its 160 kilowatt hours of onboard lithium storage. It's a stationary grid-tied asset but the grid connection is a low voltage grid connection, we're talking 208 volt

split phase or 240 volt single phase connection that enables the fast charger to effectively function like a hot water heater would.

Next slide.

So this is just to give you sort of a sense of how we see our site host customers sort of monetizing the potential revenue. And the only thing I'll say here, beyond the visual, is that EV charger revenue, because of the uncertainty around utilization, is the biggest sort of obstacle we have to overcome in recruiting customers and getting them to invest.

And I would also just point out that the demand response capabilities of an energy storage focused unit like this go above and beyond sort of conventional DC fast charging.

Next slide.

I'm going to skip the COVID-19 impacts, given that I have a minute remaining, and jump to my next slide.

So in line with this panel, there's just a few points that I think could help with this effort to scale-up private investment and that is kind of demonstrating the business case with new technologies and simplifying the process for

folks who want to participate in the programs that do exist in the state.

And so integrating DC fast charging with energy storage can really redefine the business case. Similar to the synergies that we've seen from solar and storage integration, DC fast charging and storage integration, like our Boost Charger, could really bolster the value prop for fast charging by reducing the cost and time frames and installation. We estimate that, on average, it will take two months or less to deploy a Boost Charger, which solves for sort of the speed of fast charger deployment and the challenges the state is facing there. And the associated costs of low voltage infrastructure, if any upgrades are even necessary, are dramatically reduced this technology.

We buffer against demand charges. And I know the CPUC is considering sort of providing relief through various rate-making proceedings and has in one instance for within the PG&E territory. But I would submit that batteries can buffer demand charges. The grid will only ever see 20 kW from our boost, even when a vehicle is pulling 120 kW from it.

And then we're significantly extending the geography of sites where DC fast chargers can practicably be located. There is a lot of this low-voltage infrastructure necessary for a system, like the Boost, readily available at most commercial sites. And we would -- I would submit that we would enable fast charging through this project at a host of sites that are strategic sites for locating refueling infrastructure from a transportation planning infrastructure that are otherwise infeasible based on grid constraints, especially in urban and rural areas.

So one proposal, and this dovetails off of what Marc just alluded to, it could be sort of an interim step in getting a state-backed loan program and sussing out what that utilization risk is and what the state's risk and what the state's risk would be on a guarantee would be to implement the state-funded financing pilot based on utilization risk wherein loans for innovative DC fast charging deployments, especially those with complex sort of integrations of different technologies, would be available to take advantage of the financing but the state would be agreeing to repayment that would solely be based

on the assets revenue generation from that charging.

I recognize it would be a lot of risks for the state. That's why the program could be sort of a pilot and relatively small in scale at the outset. But I think it could also be offset by cost recovery as utilization increases.

Finally, successful demonstration of a utilization-based financing approach could -- would spur private sector investment quicker, creating a new model for private financing, akin to what we've seen in energy efficiency and renewables.

My last suggestion here is to create a one-stop-shop for EVSE incentives and state financing opportunities. And this is near and dear to my heart. There's a plethora of incentives available in California from CALeVIP funding, Air District programs, utility incentives, and various local funding initiatives, not to mention things like LCFS. Trying to get access, accessing that financing, it requires separate applications through separate agencies following separate processes and, on the back end, you'll separate and

redundant reporting requirements.

I worked for the government of New York. I was the Assistant Secretary for Environment in New York. Governor Cuomo is the champion of one-stop-shops. State agencies would roll their eyes every time he wanted to implement them. And after he implemented a one-stop-shop, like the one-stop-shop he implemented for the craft beverage industry, the industry would laud him and growth would actually occur. You would actually see substantial change. And, in particularly, for small companies, like our own, the administrative burden created by this is just something that is a real obstacle to our ability to meaningfully enter the marketplace.

The last point is that the one-stop-shop approach would allow you to consider total project costs. Siloing utility make-ready programs from equipment incentives results in a failure to truly consider total project costs and those projects that are most economic. It was fine when we just had DC fast chargers that all required the same 480 volt three phrase grid infrastructure. You had a reasonable expectation that chargers with the same nameplate capacity

would require the same make-ready infrastructure. We should think about these things together. And I think you could actually get more economic solutions that would be more attractive to the private sector and less state subsidy necessary to move them forward.

That's all. Next slide.

MR. OLSON: Thank you --

MR. SHAH: Thanks.

MR. OLSON: -- very much, Rajiv. Appreciate your deep dive discussion there.

At this point, Commissioners, your opportunity to raise questions about of panel members.

COMMISSIONER MONAHAN: Well, thanks. Thanks to the panelists.

And I see, Cliff is raising his hand. I'll ask a quick question then turn it over to him.

So -- and I've got to say, now I want to see Tim's presentation on what the CEC has been learning on -- about the financing, looking at low-interest loans as a strategy.

I wonder, Rajiv, you mentioned innovative DC fast charging, but does it have to be

innovative? I mean, the question is: Would a low -- would we be able -- you know, would a low-interest loan program allow for scale-up? And what would it take to do that?

And I think Tim is going to delve into this a little deeper, so -- but just curious about your thoughts on that, and maybe other panelists, as well.

MR. SHAH: So I think, if you're going to follow sort of a utilization risk-based approach, it might be really good to test sort of the potential of particularly innovative fast charging solutions that are particularly uneconomic in terms of how they pencil out at the higher charging speeds, is what I guess I was talking about with innovative there.

If you're talking about a low-interest loan-based program, actually, where I wanted to go with my one-stop-shop suggestion is, actually, you should be looking at financing alongside subsidy.

So one of the things in New York that we were -- that our agency was struggling with, it was an environmental agency, actually, the Environmental Facilities Corporation, which

administers water infrastructure financing, was that they were not getting out their zero-interest SRF loans. We had over $1 billion in zero-interest state revolving fund loans just sitting there.

And when we paired the administration of the loan program with municipal grants -- and they could be much more modest than the grants for charging and what's being offered in charging because the formula there, just the water is just different -- but the overall point is that consolidating the process and combining sort of the access to the loan and some of the administration of loans on the state side just can't be as efficient or fast as the private sector. So what I gain as a private sector customer, in accessing the low-interest rates, I might be losing in sort of the lead time it takes for me to get approval through a program like CCAB. If it's being administered alongside sort of my application for a grant incentive, it gives you folks, as regulators, a more sort of holistic view of the project costs from both a financing and a subsidy site and more ability to get out these attractive loan structures.

But, no, I don't think it necessarily has to be innovative. I think it should probably be DC fast charging focused but that is -- that's my thought there.

MR. SHAH: Rajiv. Let me jump in on this.

And, Commissioner Monahan, thank you so much for, actually, this question. It's actually an important one. And thank you for having us today.

I think the key question is, really, how do we deploy EV charging infrastructure and maintain it for the long term? It's not about innovation of technology. The technology is known. And it doesn't matter how fast or how low, it matters on the real estate.

The IOU programs, the pilots, have shown this, clearly, that working -- it's a trine goal between the energy, the grid, and the services, all the ancillary services, VGI included, the real estate offers that go in there, and mobility and, essentially, all what the car companies and OEMs in general can provide.

The point here is can we actually use data to make the public funds better allocated?

Can we actually get grants to say and design and measure the impact of the EV infrastructure that we have deployed?

One of your staff members, Commissioner Monahan, Noel, I'm a great fan of him. He thinks, you know, deep and wide about this stuff in a really careful way. Is really how is the infrastructure that we deploy making an impact on the EV adoption that want and how do we measure that? Because if we're measuring it in just number of chargers and we just have to put a lot of chargers everywhere versus we are actually delivering miles, we are actually converting vehicle miles traveled to electric vehicle miles traveled, you know, the KPI is totally different.

And so I think, for me, we should try to allocate essential funds that are going to then multiply the impact of every fund that are available. And especially after what we've been living through, we're going to have less and less funds that are allocated to this.

So that's one point.

And the second one is actually, simply, all of those actually can be contributing to the response that we have, you know, in terms of,

essentially, putting people back to work.

MR. REINECCIUS: I'd like to support what Abdellah is commenting but I'd also make an additional point.

I think that attempting to directly fund the equipment when the property owners and the real estate, which is the essential decision maker for the long run, is not a good use of funds. I think guaranteeing some level of performance, to Rajiv's point, is a good idea. But I also think that funds need to be shifted to the upfront, the development, the location, and the education of the real estate partners that we want to get in because those are the people that have access to the funds. They have the balance sheets. They have the credit. They have the cash flow from the rents of their properties. And they can bring far more capital at lower costs, even than the utilities, especially utilities who are credit damaged and emerging from bankruptcy.

So we can get much better leverage and more infrastructure and more miles driven on electricity if we focus on encouraging those property owners to make investments but with

reduced risk and increase their education.

MR. CHERKAOUI: Let me double up on this, Stacey.

If we have business models that actually have shown historically quickly bring in private capital, a lot more than just selling kilowatt hours, shouldn't we actually use those to leverage the public funds and have a multiplier effect on those? And I think we can show this, we can prove it. We have history on this and, you know, those would be incredible ways to, essentially, show, so put data on one side and a multiplier of bringing in private capital for any public funds.

We know we have to deploy millions of EV chargers in order to get where we want to be. We know this. There is no question it has to be done with utilities. There is no question it has to be done with public funds. But how do we, essentially, use, leverage, prove, show the usage of private capital where we have a few models? And we have been experimenting, some of us have been for a while now, and we can prove it. We can show it. And, in fact, our investors will, essentially, say, hey, these guys have figured

out one key thing. And all of this is complimentary. I'm not saying one model is better than the other --

MR. REINECCIUS: Correct.

MR. CHERKAOUI: -- but there are so many multiple use cases. I'll stop there.

MR. REINECCIUS: I do agree with you on that. My point is just that we have got to bring the whole universe of potential drivers and customers in rather than just the low-hanging fruit elements.

I think what you guys have done with the advertising support and what I see other folks starting to do with advertising support is a great way to get awareness and start to build that demand. But people are not going to necessarily fall completely within a single model for all their charging needs. I think people will charge in many different ways but we have to provide an infrastructure that encourages them to buy a vehicle. And we have to get them to be able to rely and feel comfortable on that vehicle.

Especially when there are power outages that are projected for the next ten years,

according to the CEO of PG&E, we have to have resilience, which means battery. We have to speed. And we have to have minimal utility interaction in terms of infrastructure, you know, to Anand's point and to FreeWire's point.

So I think everybody that has made a presentation has a piece of the elephant for sure. But I think we need to focus less on building ports. And much to Noel's comments about TERPA, we need to focus on how to effectively get more vehicles served for a given dollar and more miles served for a given dollar than just getting ports in the ground.

MR. SHAH: I think an attendant issue, and this is especially an impact on DC fast charging deployments, is if we can -- if you get it wrong on a DC fast charging deployment and the band doesn't materialize because the site was the wrong site, well, you've sunk most of your costs, at least 50 percent, sometimes as high as 80 percent of your costs, underground. You're not moving that fast charger for -- economically, unless you have something that is sort of infrastructure-light. And so we -- the Boost Charger is grid-tied and stationary but it can

actually be practicably -- be relocated; right?

And so, you know, are we getting ahead of ourselves in some of these instances with massive grid infrastructure upgrades when we do have a lot of fast chargers? I know this anecdotally, but I also know the data probably bears this out, that to just unutilized all day through California, and that dynamic may never change, even if EV adoption goes where we all hope it goes in the coming years.

MR. REINECCIUS: I think that your point about grid light and Anand's point about behind-the-meter are absolutely essential. We agree and that's the way we've designed our EV systems as well. And the characteristic, not only in our experience, projects that we did, for example, at San Francisco, we had about 90 percent of our cost was dealing with the utility, not even the equipment. So -- and 18-month-plus delays due to having to do infrastructure upgrades.

So we went back and we did a whole next generation of our technology to eliminate those upgrades wherever possible because it was the utility that was the bottleneck, not the interest from the drivers.

But behind-the-meter is definitely something to support.

MR. RANGARAJAN: Let me --

MR. OLSON: Commissioner Monahan, I think Commissioner Rechtschaffen, also, had raised his hand. There's time for more questions.

COMMISSIONER RECHTSCHAFFEN: Well, I don't know, Tim, if there's time enough. This was very interesting to hear the panelists talk among themselves. So you tell me whether or not there's time?

MR. OLSON: I think we have about 15 minutes total for their remaining Q&A, which includes the stakeholder Q&A.

COMMISSIONER RECHTSCHAFFEN: Okay. Well, I first want to thank Stacey and Marc and Rajiv and everybody. Stacey correctly pointed out that years ago, several years ago I said, "There's no unlimited public funding for charging," and that's even more the case now in the context of the gaps and the needs. But you guys are all coming up with very creative ways to fill the gap.

I have time for two questions.

Marc, if I could ask you about EnelX's

focus on tariff solutions. Is the big advantage there just it's the cost for the infrastructure upgrades are predictable and knowable? Is that -- they're -- as I -- I'm not understanding you to suggest that they be socialized and paid for by all the ratepayers, just the customers causing the upgrades, but that they are predictable. But maybe you can explain?

MR. MONBOUQUETTE: Sure. I think the basic premise is that the expectation for service for infrastructure is predictable. The cost of whatever upgrade might be entailed is going to vary by site and by customer type. But just the availability to pursue a project and know that, you know, utility has, you know, A, B and C responsibilities for deploying infrastructure on a certain timeline and that, at some point, the cost of any upgrades will be known. You know, just laying out a standardized process, like is established for DG interconnection, would go a long way towards enabling some of these new financing approaches.

And that's inclusive of the recommendation to put a load management or behind-the-meter option for meeting some of those

infrastructure upgrade needs directly against the cost of that upgrade. So it's a way to look at deploying VGI in the early days of the market in a way that doesn't require, you know, a lot of administration or cost tests or anything like that.

COMMISSIONER RECHTSCHAFFEN: Thank you. And we don't have time for this but I would be interested if you could share with us in more detail your ideas for on-bill financing that you mentioned, since that's something that's of interest to all of us, especially as a way to deploy low-cost capital and stimulate investment?

I have a question, quickly, for Stacey.

Stacey, I heard you say -- or not -- I looked in your slides. And one of the points you made in one of your slides is that it's really important to clarify the cost responsibility of Ruel 16-related costs. And I don't know exactly what you were referring to. Just have a clear rule that these costs are socialized or what?

MR. REINECCIUS: No. This goes back to a project that we did a lot of work on. You are probably familiar with our San Francisco deployment in multifamily that wound up having to

be stopped due to time delays and issues around the SGIP incentives. In the course of that, we found that in 100 percent of the buildings with 400 amp services, as verified by onsite inspection, that the utility had undersized the dropline to those buildings by between 65 and 75 percent, meaning that if you actually attempted to draw the building's rated capacity according to its main breaker, that you would overload the dropline and potentially cause a fire.

And the utility admitted in front of PUC Staff, after we filed a complaint, that they had done that as a method of ensuring that property owners would pay for an additional fee to upgrade those lines when they actually needed it, as opposed to doing the safe thing which was sizing the droplines to the size of the service in the building.

The eventually relented in our case but not as a general matter. So we went from a $186,000 per building utility fee to $6,000 as a result of that complaint. But I'm sure that other people are encountering the same thing, especially given that they said that this had been a longstanding policy on their part to

undersize the droplines.

COMMISSIONER RECHTSCHAFFEN: Thanks.

MR. REINECCIUS: You know, with the advent of more and more vehicles and the progress towards full electrification, they're creating an unsafe condition in over 2.2 million buildings just in PG&E territory, so that needs to be addressed.

COMMISSIONER RECHTSCHAFFEN: Thank you, Stacey. Okay. Thanks very much.

MR. OLSON: So are there other comments from Commissioners? Okay.

So I think we have a few minutes, just to go through some of the questions I've proposed here.

And, Anand, I'd like to ask you, now you heard the testimony that we have a limited amount of incentive money. And COVID-19 may have it be -- may create an impact on that, what's available in the near term.

Is there a limit on the available private capital to make investment in this area? And you need to un-mute.

MR. RANGARAJAN: Thank you, Tim. I'm sorry I'm having so much trouble with my Zoom

connection.

Yeah, you know, I was going to make the case that it's possible, even under the current conditions, to lever government funding significantly, by as much as maybe 40 times. There's plenty of money sitting in the sidelines, looking for clean investments, but there are not enough projects to go around.

And I was going to say that it's not a question of whether the state government should lend money into the projects with loan guarantees, low-interest loans, and things like that. There's plenty of that funding available on PURPA projects once they are de-risked.

In my opinion, and it follows kind of the track in the solar business, the most difficult part of the funding to raise is the early stage risk capital prior to construction. And I was going to make the case in my presentation that CEC and other agencies, possibly, should participate in this early stage development with the developer with an equity investment rather than traditional methods of providing grant funding or loan guarantees and things of that nature. And that equity investment would signal

many, many different things and it will facilitate many things, including aggregation of projects.

One of the challenges in this kind of infrastructure project is that the infrastructure assets are distributed and the individual investments are small, and so you need a way to aggregate the projects. And if you don't want to aggregate the projects, there's plenty of financing available from traditional infrastructure funds. And just like solar, it's entirely possible that the EV infrastructure will become an asset class unto itself and it can participate in long-term infrastructure financial markets quite easily and maybe even asset-backed security.

So to your point, there's plenty of money available in the private markets. And I believe there is also plenty of incentives already within the California state government to things like LCFS, whose funds are not properly being utilized, at least in the EV infrastructure business, which can be used.

But I'm of the view that the critical funding requirement is not how much money the

state should put in but when it should put in the money and in what form. And I'm an advocate for putting in the project early on in the development as equity funding, not as grant money. The equity can be paid back. Maybe even the state government could make money on it for reinvestment purposes. But this is a way to not rely on either IOU-type allocations or other state funding mechanisms. This is a way to unlock private capital systematically and in a predictable fashion.

I don't want to take too much time. I'm sorry I had so much trouble with my Zoom connection.

MR. OLSON: No problem. Thank you very much.

I think we have to shift over to the attendee Q&A at this point.

But each of the panel members, one of the questions I'd like to ask, we don't have to go into this, but if you could submit into our docket the top recommendation or top couple recommendations for what you change in the existing government interventions, grant programs, regulations, whatever it is, and also

your recommendation for new initiative and that doesn't exist today that would help accelerate this market adoption.

MR. RANGARAJAN: Okay.

MR. OLSON: I'd appreciate if you could submit that in our docket.

MR. RANGARAJAN: Okay.

MR. OLSON: So, Heather, I'm going to turn this back over to you and we'll see if we have time for some Q&A.

MS. RAITT: Yeah. Thanks Tim. This is Heather Raitt. And thank you to all the panelists.

It actually looks like we don't have any Q&A from the attendees right now. So barring any burning questions, I think we could probably close out this panel, unless there was another burning question you had, Tim.

MR. OLSON: Well, I think it's going to -- I have a question for all of the panel members. I think we're going to run over.

MS. RAITT: Okay. All right. Well, then maybe we should close and just move on to your presentation?

MR. OLSON: Okay. So I appreciate it

everybody. Thanks again for your participation. And I'm going to do a quick summary of another parallel proceeding and what we found in that process so far.

So let's go to the first slide on that please. Okay.

So what I've found in this, we initiated a proceeding that is trying to do three different things but, primarily, trying to attract -- what effort is needed to attract greater amounts of private capital into -- in the case of this proceeding, it's basically a whole range of clean transportation project opportunities.

And it starts, it begins -- it began, actually, back in the March-April time frame as an information gathering. We refer to it as a request for information. And what we envision is this will be, probably, a year, a year long or year-and-a-half long activity. And -- but we posed some questions to outsiders. And it's a whole range of investor types, many, like Anand, who are private equity, smaller kind of nimble equity investor-type of companies, some commercial banks, definitely investment banks, New York investment banks, pension funds, a whole

range.

And then we've also opened this up to developers, host site owners, vendors from the whole range. Originally, this was focused on only -- well, our thought was infrastructure and fuel production. But as we went through some discussions we found that there's a great interest in vehicle investing, and particularly in leasing programs, so we added that into this effort.

And the objective is to do two -- do three things. One, as you could see the theme from that panel is should -- are there things we could be doing to modify the existing programs and incentive efforts right now? And are there other things missing that cold trigger more capital investment? In fact, what we've found is that second category, new initiatives, is where we had lots of input from investors. And the whole point of all this is if we see some ideas that we want to try out in a pilot kind of basis, that we deploy our existing money and try out things to see whether they work and whether they can scale up.

Let's go to the next slide. And can we

go to the next slide please?

And these are the entities that we have been seeking information from. It's a whole range of, mostly, investor, fuel development, our sister agencies. All the state agencies are -- have been invited into this process, so it just not -- would not only affect us but could be some insight for how they're deploying their money.

Let's go to the next slide.

And we have achieved a couple different things in this docket. We have close to 30 different docket submittals and probably another 20 entities that want to make comments. And I've kind of divided these. It's really hard to do this in a couple slides, to summarize everything that we got. And I want to thank Kasha Carr (phonetic) and Neil Kenney (phonetic) for helping me put this together. They've been summarizing all the comments.

In essence, you heard today, this panel session this afternoon was this idea of exploring mechanisms to aggregate demand and scale-up of EV charging. And the nature of that is what one company described as configuring the charging, the physical location of the charging and the

timing of the charging, to match up to other revenue streams and other demands. And those things, you heard in this panel, include ideas like matching up to the ISO balance -- imbalance market, week-ahead/day-ahead renewables, storage, grid ancillary services, and demand charge management are some of them. And each one of those has different maturity levels and different potential revenue streams.

But the idea is if you aggregate a number of charging sources, vehicles and locations, that you have a volume that could make a difference in those other markets. And it's still -- this is all still on the stage of kind of early development. The panel members today are examples of those that excel at that. And I'd say one key attribute you see in all those companies is their software platform understanding and their expertise in managing data and knowing what's going on in the holistic market.

We heard other things, like align all the programs of the existing programs. And you hear this from entities like CALSTART that we have a funding forum where all the agencies meet,

including state, federal and local, and how to figure out how to align the vehicle infrastructure and other incentives together and try to make it get a bigger bank for the buck, so to speak?

We -- you heard Stacey Reineccius comment about this integration of EV charging with solar and this idea of leveraged real estate, his example, multi-unit dwellings. We heard, remember, in earlier workshops that the most difficult market was MUDs. And, in fact, we heard testimony that no one sees an answer to that. Well, you heard a person today describe potential solution. And I won't go through all of these different things.

Let's go to the next slide because this is the area where most of this input came from investor types. And they said three things -- basically, two things. Make sure you keep the LCFS in position. That is the kind of foundation if you want our investment to flow. But we need to see some kind of long-term contract approach.

So what Noel presented under TERPA, or what Commissioner Rechtschaffen was talking about, may be an offshoot of that reserve option,

lowest priced bid type. That tends to create long-term contracts.

And the investors also said, if you establish a multi-year, very certain investment tax credit idea, and then it could displace, pretty much, all of the government grant programs. And so that idea is coming from kind of the more established investment banks, the bigger investment banks, who want to deploy lots of money. And that really depends on the maturity of different areas in the clean transportation fund.

Interestingly enough, the loan guarantee idea was the only reference that I saw in the submittals in our dockets that refer to loans. In fact, I think Anand kind of referred to this as it really is a risk capital investment up front for this electric vehicle charging infrastructure.

And the question was: Would a loan really make sense versus a grant? And our experience with trying a pilot out through the State Treasurer's Program, a $2 million pilot, that has not worked. In essence what we found is if you have a loan program side by side with a grant

program, no one is going to use the loan. And it wasn't leveraged very well on the two applications that came into that. It needs some tweaking.

And I know there's a lot of discussion at the Governor's Office. My interaction with Go-Biz, specifically Dan Adler, OPR, the Office of Planning and Research, refers to a lot of loan kind of programs. I'm not so sure that they're the best options and -- but we need to probe and do more work on this, so that -- let's go to the next couple of slides.

And, in essence, we're -- I kind of referred to this already. Let's go to the next slide.

What we're planning to do is put this together to summarize these comments. Maybe, Commissioner Monahan, this may be the first time you've heard some of this. We were planning a briefing for you in early July. Your office is looking for a time frame for that. And the idea is still form some workgroups so you get dialogue between all these parties, including the investors, the developers, the host sites, the vendors, et cetera, and possibly doing workshops

from that. A lot of the discussion tends to be one-on-one meetings or small workgroups at this point. And then see whether those ideas can be tested out at pilot solicitations, at least from our agency's standpoint.

I think let's go one more slide. I think I'm finished with this. Yeah. That's it. So if you have any questions, I'm open to that.

COMMISSIONER MONAHAN: Great. Thanks Tim. I I'll hold off questions until we have a deeper dive sometime in July but thank you. I don't know if, Commissioner Rechtschaffen, if you have any questions for Tim or -- I know you had a hard stop soon.

COMMISSIONER RECHTSCHAFFEN: Yeah. I've got to leave in about ten minutes. I want to thank everybody.

Tim, the loan guarantee program that didn't work, you said it was side by side the grant program. I don't know, are you drawing broader conclusions from that or just the obvious conclusion, that if you can get money for free you're not going to use a loan guarantee program? But for your experience and the feedback you got, what is your sense of the utility of those

programs more broadly?

MR. OLSON: Well, from one standpoint the -- it's a loan. It's a direct loan. Our money was deposited in the Treasurer's Office. They have an existing group of commercial banks registered under their CalCAP loan program, which means it's a small business loan program. The minimum -- the maximum investment is $500,000. So quite often the projects were restricted just by the amount that was expected but -- so bigger projects, and even medium-sized projects, just really wouldn't qualify for this. And there was not a leverage from that loan.

But what we have found in another area, I have a meeting tomorrow with insurance companies, several insurance companies, to explore the state-backed guarantee to deploy insurance money investments in different kinds of projects where they're securitizing those -- that investment through repayment from selling insurance policies for -- insurance policies and warranties on the equipment for the installations. And so would it cover everything? No. But it's a significant investment from a private source. And they are specifically interested in a handful of projects

that they want to bring forward.

And the point of that was it would be great to have a state-backed guarantee for that. The issue with a guarantee is if something goes wrong, is there a big drain on the State Treasury to pay that back? And, you know, if meaning something goes wrong, bankruptcy, failure of the technology, it's really a question of how comfortable is the state government putting out either a loan or a guarantee and having assurances that they're going to get repaid or that there won't be a big draw on the Treasury?

COMMISSIONER RECHTSCHAFFEN: Okay. Thanks. And I'm just going to -- I have to sign off in about five minutes, so I want to extend my thanks to -- deep appreciation and thanks to the CEC staff, my fellow Commissioners, all the panelists for an excellent three-part workshop, a lot of ideas that we've heard and a lot of interesting food for thought, very, very substantive and very well done. So thank you very, very much everybody.

MS. RAITT: Thank you, Tim.

Thank you, Commissioners.

With that, it sounds like we are ready to

move on to the public comment portion of our workshop.

Excuse me. And I am Heather Raitt. I should have announced myself.

So we're asking folks to limit comments to one person per organization and three minutes per speaker. And if you're on Zoom, you can go ahead and raise your hand using the raise-hand function. And there you go. Someone just used it. That let's us know that you'd like to comment.

And if you're on the phone and you wanted to comment, press star nine to raise your hand. And then for muting and un-muting your phone, you press star six.

So we have RoseMary Avalos from the Public Advisor's Office with us today to help manage the public comment.

So go ahead, RoseMary.

PUBLIC ADVISOR AVALOS: Okay. Thank you, Heather.

I'll first call on attendees 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 un-muted

and before commenting.

Cory Bullis please.

MR. BULLIS: Good afternoon. You have Cory Bullis here on behalf of the Electric Vehicle Charging Association. My name is spelled C-O-R-Y B, as in boy, -U-L-L-I-S.

I just wanted to respond to a question raised earlier in today's discussion by Commissioner Monahan about the potential for, you know, shifting away from incentives for EV charging stations. You know, when is the time to do that?

I guess I would just say generally, you know, while, of course, as an industry, we don't want to be dependent on incentives forever. Certainly as it relates to the short term or as we think about the short term, we definitely think it's too soon to be shifting away from incentives or ramping -- actively ramping down incentives. I think as always, while we have made great progress in deploying charging stations, we still have a long way to go to truly reach the inflection point we're looking for in terms of achieving, you know, true economies of scale, enabling mass deployment of charging stations

across many different use cases.

In our view, CALeVIP, which has been instrumental in deploying EV charging stations, is still young. There have been some incentive project areas that have gotten off the ground later compared to others, so we still think it's kind of young, new, and we're still counting on that program and incentives, generally, to keep spurring EV charging deployment.

And just, I mean, I know everyone knows this by now but at least, you know, right now with the current climate we're in with COVID and a recession, this is that much more true in terms of needing incentives, at least as it relates to the short term.

Thank you.

PUBLIC ADVISOR AVALOS: Thank you, Mr. Bullis.

Next commenter, Mark Roest, go ahead. Un-mute your line please.

MR. ROEST: This is Mark Roest with Sustainable Energy, Inc. M-A-R-K R-O-E, as in Edward, -S, as in Sam, -T, as in Tom.

And I'm -- Simon and Phillip and others, we would like to see some financial support for

completing development in commercializing a family of technologies that creates breakthroughs in batteries and solar PV. Our batteries are designed to store 1,500 kilowatt hours per kilogram shortly after mass production begins in two years, probably, at $100 per kilowatt hour pricing. As far as ceramic semiconductors, so far, is not an issue. That capacity is five to seven times where the rest of the lithium battery industry is headed.

The solar PV, also a ceramic semiconductor, is headed to 36 to 48 percent efficiency at competitive per week per kilowatt peak prices, so it will take about half the space in canopies over the bus or truck yard that today's flat panels take. This means it will be cost competitive with cash flow -- in cash flow, if financed, to generate over 90 percent of the electricity in regard to annually onsite, very little impact on the grid.

I said if we can get financial support because we are in the valley of death and out of money but we're working on the technology anyway for -- working on battery technology for 7 years very actively and 20 years, including the

research before that. And the solar technology goes back to 1973 when it was patented -- 1983, sorry, when it was patented.

I'm done.

PUBLIC ADVISOR AVALOS: Okay. That concludes the comments from Zoom, as well as the phone line, and I'll hand it over to Heather.

MS. RAITT: Okay. I just want to -- this is Heather Raitt. I just wanted to give folks a moment more to press star nine if they're on the phone and wanted to comment. Okay. It doesn't look like this.

So, Commissioners, I don't know if you have any closing remarks you'd like to make?

COMMISSIONER MONAHAN: Well, just thanks to everybody. I'll reiterate what Cliff said. It was really just a great substantive two days of information. We have a lot of food for thought. And looking forward to working with Heather and the other folks that are helping write the IEPR to see how we can distill this information and communicate it out.

So I'd also encourage folks to give us some feedback in written form if you weren't able to share what you wanted to share today,

preferably.

So thanks everybody.

(The workshop concluded at 4:45 p.m.)

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 29th day of September, 2020.

MARTHA L. NELSON, CERT**367

CERTIFICATE OF TRANSCRIBER

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.

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.

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.

MARTHA L. NELSON, CERT**367

September 29, 2020