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BEFORE THE

CALIFORNIA ENERGY COMMISSION

In the matter of,	)
	) Docket No. 19-IEPR-04
2019 Integrated Energy Policy	)
Report (IEPR)	)

STAFF WORKSHOP RE:

CLEAN TRANSPORTATION PROGRAM BENEFITS REPORT

AND SUCCESSES FOR 2019 IEPR

WARREN-ALQUIST STATE ENERGY BUILDING

1516 NINTH STREET

1ST FLOOR, ARTHUR ROSENFELD HEARING ROOM

SACRAMENTO, CALIFORNIA 95814

THURSDAY, JULY 18, 2019

10:00 A.M.

Reported By:
Gigi Lastra

APPEARANCES

CEC Staff Present

Larry Rillera, Fuels and Transportation Division

Presenters and Panelists Present

Zero-Emission Vehicle Infrastructure Panel

Moderator - Tim Olson, California Energy Commission

Andy Hoskinson, Center for Sustainable Energy
John Schott, ChargePoint, Inc.
Dana Boudreau, Redwood Coast Energy Authority
Richard Schorske, Electric Vehicle Alliance
Shane Stephens, FirstElement Fuel, Inc.

Zero-Emission Vehicle Technology Panel

Moderator - Ben DeAlba, California Energy Commission

Kent Leacock, Proterra, Inc.
Morgan Caswell, Port of Long Beach
Jannet Malig, Cerritos Community College District
Jasna Tomic, CALSTART

Low-Carbon/Clean Air Projects

Moderator - Elizabeth John, California Energy Commission

Seungbum Ha, South Coast Air Quality Management District
Sarah Gonzales, Pixley Biogas LLC dba Calgren Renewable Fuels
Erin Donnette, World Energy (AltAir Fuels, LLC)

Clean Transportation Program Funding Summary, Benefits Report Summary, and Benefits Report Methodology

Susan Ejlalmaneshan, California Energy Commission
Christopher Neuman, National Renewable Energy Laboratory

Public Comments

Jonathan Changus, Center for Sustainable Energy
Jasna Tomic, CALSTART
Steven Brooks, Iwatani Corporation
Steve Wallach, Center for Transportation and the Environment
Hannah Goldsmith, California Electric Transportation Coalition
Brian Goldstein, Executive Director, Energy Independence Now
Bill Elrick, Executive Director, California Fuel Cell Partnership
Sara Rafalson, Market Development Director, EVgo
Wayne Laity, Business Development Manager, Shell Hydrogen Company
Stephen Ellis, American Honda Motor Company
Kathryn Garcia, Sierra Club California

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P R O C E E D I N G S

JULY 18, 2019 10:00 A.M.

MR. RILLERA: Good morning. Welcome to today's staff workshop on the Clean Transportation Benefits Report and Successes for the 2019 Integrated Energy Policy Report, or what I will refer to as the IEPR.

My name is Larry Rillera. I'm staff with the Fuels and Transportation Division, here at the Energy Commission.

I'll quickly go over a few housekeeping items. Restrooms are located in the atrium behind you, out the door and to the left.

If there is an emergency and we need to evacuate the building, please follow staff, me, to the Roosevelt Park, which is diagonal to the Energy Commission building here.

Today's workshop is being broadcast through our WebEx conferencing system and parties should be aware that you are being recorded. We'll post the audio recording on the Energy Commission's website in about a week and the written transcript in about a month.

I will first be presenting a brief overview of the Clean Transportation Program investments to date, and project successes that will be highlighted today. The presentation provides a foundation for the

discussion that will ensue.

Participants on three panels will share their projects, highlight project successes, and respond to questions via a panel moderator. The three panels are focused on Clean Transportation Program investments into zero emission vehicle infrastructure, zero emission vehicle technologies, and low carbon projects.

At the conclusion of the first panel, we will break for lunch. When we reconvene, we'll have two more panels.

The last portion of the workshop will focus on Clean Transportation Program funding, the Benefits Report, and the Benefit Report methodology. This will not be a moderated panel. We will, instead, have presentations by Energy Commission staff and staff from the National Renewable Energy Lab.

We will conclude the workshop with public comment.

Materials for today's meeting are available on the website and hardcopies are in the back of the room.

Written comments on today's topics are due on August 1st. The workshop notice explains the process for submitting your written comments.

Finally, I would like to thank all of our participants today for being here, and committing their

generous time, and certainly their perspectives to the Energy Commission and the public.

With this setting, let's begin. In 2007, the Legislature established the Clean Transportation Program within the Energy Commission. The program is funded through a small surcharge on California vehicle registrations, which provides up to $100 million per year, depending on how much is collected from the surcharge. The law also requires the Energy Commission to include an evaluation, the Benefits Report, of the program's efforts as part of each biennial IEPR.

California Assembly Bill 8, in 2013, extended the program through January 1st of 2024.

The program was developed to provide funding support for projects that reduce greenhouse gas emissions within the transportation sector. The funded projects also contribute to other complementary State goals, including approved air quality, promoting economic development, increasing alternative fuel use, and reducing petroleum dependence.

The Clean Transportation Program is guided by a range of dynamic policies by the Governor and the Legislature, as noted. A key policy includes Executive Order B-48-18, which reaffirms California's commitment to zero emission vehicles, or ZEVs, as I will refer, and

sets a new goal of 5 million ZEVs by 2030. This policy also reaffirms ZEV infrastructure targets for plug-in electric vehicle chargers and hydrogen refueling stations to support this projected growth.

To date, the Energy Commission has provided $830 million in Clean Transportation Program funding. By far, the largest investment is in the electric transportation sector.

To demonstrate its commitment to diversity, the Energy Commission adopted a resolution during the April 2015 Business Meeting to firmly commit to increasing outreach and participation to communities of concern. The Energy Commission is committed to taking steps towards broadening the pool of applicants to the Clean Transportation Program.

Clean Transportation Program participation helps to ensure equitable access to Energy Commission funding, creates jobs, and provides economic stimulus in under-represented communities, disadvantaged communities, and to small businesses.

Increased competition to ensure the best opportunities are identified and funded and assures that local needs are identified and addressed.

The Clean Transportation Program has invested heavily in publicly available electric vehicle charging

infrastructure. Investments in this area support the State's ZEV deployment and ZEV infrastructure goals, as I had indicated earlier.

In partnership with the Center for Sustainable Energy, the California Electric Vehicle Infrastructure Project, or CALeVIP, targets incentive funding to simplify the funding process and accelerate charger deployment.

It should also be noted that the Energy Commission invests in electric vehicle charging that complements other sources of funding throughout the State.

Clean Transportation Program funding is the primary source of funding for the construction of hydrogen refueling stations in the State. Existing law directs the Energy Commission to allocate $20 million annually to fund the initial network of 100 hydrogen fueling stations. There are 39 hydrogen fueling stations that are open today; 12 stations are located in disadvantaged communities. The total hydrogen refueling network of 64 stations can dispense up to 17,000 kilograms of hydrogen per day.

For today's workshop, five representative projects for ZEV infrastructure are highlighted. These project successes represent efforts that started early

in the ZEV infrastructure portfolio of the Clean Transportation Program. These early efforts have subsequently attracted additional investments into these companies and to their technologies. At the same time, many of the communities where these projects were constructed have accrued environmental and economic benefits. The first panel will do a deeper dive into their respective projects.

The Energy Commission has steadily invested in ZEV technologies over the years. Investments have concentrated on medium- and heavy-duty vehicles, with a gross vehicle weight rating of 10,000 pounds or greater. This class of vehicles represent a small share of registered vehicle stock in California, approximately 3 percent, but they account for 23 percent of the on-road GHG, or greenhouse gas emissions in the State.

ZEV supply chains in California are in development and require lots of capital to produce labor-intensive projects.

Critical elements to ZEV technology adoption is the education of commercial fleets for this technology, the role in costs associated with infrastructure, and workforce support.

For today's workshop, four representative projects for ZEV technologies are highlighted. These

project successes represent a cross-section of investments into diverse, non-light-duty vehicle, and off-road technologies and markets. The second panel will do a deeper dive into these projects.

Clean transportation investments into low carbon and clean air technologies are important strategies to reduce petroleum dependence and fossil fuel consumption. Use of waste-based and renewable feedstocks are capable of producing very low-carbon-intensive transportation fuel.

Additionally, the development of low NOx engines for heavier vehicle classes has commercially proven itself in the marketplace and within a relatively short period of time.

Another hallmark of these investments has been the ability to scale production of these projects -- excuse me, products that have very low-carbon intensities. For today's workshop, four low-carbon projects are noted.

We will now shift our attention to a panel discussion. I would like to invite the first panel to the table. The first panel includes Andy Hoskinson from the Center for Sustainable Energy, John Schott from ChargePoint, Dana Boudreau from the Redwood Coast Energy Authority, Ryan Harty representing American Honda Motor

Company, Richard Schorske representing the Silicon Valley Leadership Group Foundation, and Shane Stephens at FirstElement Fuel. The Moderator for this panel is Tim Olson.

Tim, we will have until 12 o'clock for your panel questions and discussion.

MR. OLSON: Okay. Remember to push the button here to get a green sign on your mic, when you speak.

I am Tim Olson with the California Energy Commission. Welcome to today's session here. And one of the -- the guidance we received is we're not doing PowerPoint presentations today. We're asking the speakers to start off with introductory statements and for probably no more than five minutes each. And then, we're going to go into the question and answer session based on the questions. We've sent the questions to you in advance and we may have others during the course of the panel session.

So, I'd like to go in kind of an order. This order, I'd like to have Andy Hoskinson go first, followed by John Schott, Dana Boudreau, Ryan Harty, Richard Schorske, and then Shane Stephens.

So, the first point of this is let's talk about -- in terms of questions, you kind of want to use the questions as a framework. Let's talk about the first

question here, which is: We'd like you to describe your company, your background a little bit, and then what your project is, or projects, some of you are involved in several projects, that involve the Energy Commission funding.

And to the extent you can, in that five minutes, talk about the significance of that in terms of what that means in a number of ways but, basically, stimulating the growth not only for your company, but also in the market that you're involved in.

And you can see we have most of the representatives are electric vehicle charger-related type of projects, and Shane Stephens is the hydrogen fuel cell refueling infrastructure.

So, let's start with Andy.

MR. HOSKINSON: Thank you, Tim. So, I represent the Center for Sustainable Energy. We are a 23-year-old nonprofit. We're very much dedicated to decarbonizing transportation and the built environment. Today, I'll talk a little bit about what we're doing with the Energy Commission on the front of decarbonizing transportation.

We do serve as a neutral and trusted adviser to different government agencies. We are experts on clean energy and, particularly, on electric vehicles and electric vehicle infrastructure.

We implement multiple electric vehicle and electric vehicle infrastructure incentive projects across California and across the country. So, here in California we implement, for the Energy Commission, CALeVIP, which is what I'll talk about a little bit today. But we also implement CVRP for the Air Resources Board. And then in New York, as an example, we implement the Drive Clean rebate.

We have been the implementer of CALeVIP since its inception in 2017, late 2017. I'm going to go ahead and describe that project a little bit. It is a little bit different than some, I believe, of the other types of projects that the Energy Commission has funded. Specifically, it's set up to design and implement regionally targeted incentive projects for electric vehicle infrastructure.

It focuses on Level 2 and DC fast charger technology. And it is a primary component, we believe, toward reaching the State's goals for 2025 and 2030, not just for the electric vehicle infrastructure, but for the vehicles, our vehicle goals, as well as the infrastructure, is a critical component of that.

CALeVIP's implemented by working with local partners on that design and then the implementation of those regional incentive projects.

The way it's structured, about 93 percent of the funds from the Energy Commission go directly toward the actual incentives for those site hosts that are building electric vehicle infrastructure in the regions. Seven percent goes toward the implementation costs, everything from the design, marketing, engagement, outreach, technical assistance. Obviously, the application, review and processing, and the transparency elements of the project overall, as well.

The way CALeVIP is set up, it's designed as a first come/first serve incentive project. The intent with that is to combine with simple application processes to open up the market to a greater number of actors.

Walking you through a really quick example, we have a site host in one of the four regions we've launched projects, in the last 22 months in. I'll give you, as an example, a Fresno County Incentive Project, Beneficial State Bank has installed 10 electric vehicle chargers at their branch for public use. So, that's thought as a benefit, 10 electric vehicle chargers to an area of Fresno where there was not previously public infrastructure installed.

Their process involved, when learning of CALeVIP, an online application, finding and working with

specific service providers to procure equipment, install it at the site, permit it. And once they've gone through that process, a lot with local labor, they used local labor for the installation, for instance, the units become commissioned and are available to the public.

Just highlighting a couple successes, I think, over the last 22 months for CALeVIP, it went from a concept to a full web presence, with resources to help applicants move forward with electric vehicle charging, and four regional incentive projects covering 9 counties in Central California, Southern California, and Northern California were rolled out. The projects were launched in pretty rapid fashion. And the actual uptake of the incentives of those has been pretty swift, as well.

I'll just highlight that's really, I think, let to the fact that CALeVIP is an efficient and cost-effective way to get funds out into the marketplace in a rapid manner, to help make up for where we're at with regard to our 2025, 2030 goals of infrastructure build out. We've got a long way to go and speed to market is going to be a critical factor for that.

I'll stop there and happy to add more later.

MR. OLSON: Okay, and we'll come back to you throughout the morning here, with some other questions.

So, at this point I'd like to turn to John Schott at ChargePoint. So, you heard -- you know, just to kind of repeat Andy, CSE is an administrator and a very accomplished -- an accomplished understanding of how infrastructure is deployed in all these different submarkets. And ChargePoint is another part of that kind of effort going back 10, 12 years ago from the start of this program.

So, John.

MR. SCHOTT: Thanks Tim and Larry. I appreciate being with you all here today. So, my name is John Schott. I'm the Senior Grant Operations Manager with ChargePoint. So, my role strictly encompasses focusing on federal, state, and local government grant programs for electric vehicle charging infrastructure, working with those entities to advise on good, sound program design. Of course, going after those grants when they become available. And working with our sales team to help our customers leverage those grant opportunities, as well.

So, I've been at ChargePoint for roughly three years, but ChargePoint is a 12-year-old company. We were founded in 2007. For those of you that kind of understand the history and evolution of the EV market, you'll know that that predates the introduction of, you

know, the Chevy Volt and the Nissan Leaf. So, those are some pretty tough early days, but our founders were highly competent, intelligent folks who understood where transportation was going, and that the electric vehicle revolution was going to be a big part of the future. But also seeing that network charging was going to be critical and going to offer significant value and benefit for drivers, and the industry, all the players in the ecosystem, you know, including utilities.

So, you know, in that 12-year history, you know, I think we started working with the Energy Commission in earnest beginning in 2010 and 2011, when we won our first large grant from the Department of Energy, and some ARRA funding that was available at the time, to deploy a program called ChargePoint America, where we deployed roughly 5,000 Level 2 charging spots around the nation, focusing a lot on the coast, the East Coast and West Coast.

And a partnership with the Energy Commission that formed was providing some match, some supplemental funding to help leverage those dollars to build out more infrastructure in California.

I think over the course of our, you know, 10-year, 12-year history with the Energy Commission, we've been able to benefit greatly through our partnership

with the Energy Commission. It's hard to put an exact figure on it, but I'd say somewhere on the order of $30 million that ChargePoint has been able to receive both directly, and leverage for our customers to deploy charging stations, or to engage in research and development projects to help further efforts in this industry.

I'll mention a couple other projects building on that one in 2011, the ChargePoint America program that I mentioned. We had a manufacturing grant early on, from the Energy Commission, that allowed us to, what we call, on-ramp other manufacturer's or third-party DC fast charging hardware onto our network.

So, that involved building a PCBA, a printed circuit board assembly, that we were able to put into multiple other third-party manufacturer DC hardware to put those stations onto ChargePoint's network. And that was our first experience and go-around with DC fast charging, and we've learned a lot of lessons from that, looking at where we've come today, now manufacturing our own DC fast charging hardware here, in California, in our headquarters just south in Campbell.

And we were fortunate enough to win another grant to help build on those lessons learned to expand that manufacturing facility to manufacture more DC fast

chargers to build out our Express Plus platform, and to work very closely with a lot of California-based suppliers of components and parts, modules and subassemblies that will be incorporated into those charging stations.

A couple of other projects I want to mention. You know, it was thanks to the Energy Commission and a grant that we got, where we deployed a project in San Diego, focusing on multi-family housing. We deployed over 200 Level 2 ports at multi-family properties. And again, this is the first time we really cut our teeth on the multi-family sector and understanding the unique challenges to dwellers who, you know, live in these urban environments and can have challenges accessing public infrastructure and need that charging station at their community in order to adopt electric vehicles.

We also worked on an R&D program, thanks to support from the Energy Commission, to implement ISO 15118 into our home charging station, and working with Daimler to test that, and proof of concept on a Daimler electric drive vehicle. And also, deployed a pilot in San Diego County with homeowners, working closely with San Diego Gas & Electric to shift and curtail their load based on a set schedule over the course of a few months.

So, there's been a lot of experience, a lot of

history. We really appreciate and value the relationship that we've built with the CEC over the years. And just to kind of tie into what Andy was just talking about, you know, we've seen evolution of programs now from, you know, these sort of ChargePoint, you know, primed, complicated projects with, you know, fantastic projects, but now we need to deploy a tremendous amount of infrastructure to meet the rigorous goals set by the Governor for, you know, a quarter million charging stations, including 10,000 DC fast chargers for 2025, and 5 million ZEVs on the road by 2030.

So, the CALeVIP program really, I think, represents the maturity of these programs, acknowledging where the market needs to go and increasing velocity. So, now, ChargePoint can work with our customers who can go after these incentives to, you know, install charging stations, whether they be publicly accessible, or dedicated to employees at a workplace, or residents in a multi-unit dwelling facility.

MR. OLSON: Very good, John. Thanks for all those comments. You've teed up three different questions we're going to probe into later this morning, appreciate that, related to vehicle grid integration, some of the submarkets, that you mentioned one, and kind

of this approach on expansion. So, we'll get into that here, in a couple minutes.

So, next on our list is Dana Boudreau, Redwood Coast Energy Authority. Go ahead, Dana.

MR. BOUDREAU: Good morning. Thank you for having me. I really appreciate the opportunity to thank the CEC, personally, for all of their contributions to our community, and also to represent our community.

I'm the Director of Operations at the Redwood Coast Energy Authority. We're a joint powers agency in Northern California, just about an hour shy of the Oregon border. And we were founded in 2003. And our mission is to focus on energy independence for the region and primarily through building out renewable energy resources and try to do as much of that locally as possible.

Probably the most prescient grant for us was the RESCO Grant, the Renewable Energy Secure Communities Grant, from the CEC, which was an early focus on their part to evaluate remote regions, rural regions, disadvantaged communities, and what can be done to help ensure energy resilience. And that really helped us to focus on our overall mission and decide what can we do to look at the overall State energy realities and pay attention to the specific needs of our region, to come

up with a way to generate and consume energy, while paying attention to some of the realities that we're all seeing today with wildfires, and so on.

So, it was a very early awareness and that grant allowed us to get a deep dive into the specific needs of our region and, also, was it really possible for us to achieve 80 to 100 percent renewable energy for all of our energy requirements.

The good news was that it was possible. We converted that into a repower plan. And since about 2008, the CEC has served to be an economic engine for us. We've received grants to focus on building our electric vehicle infrastructure. As well as, before that, having readiness plans.

MR. OLSON: Get closer.

MR. BOUDREAU: Like a rock star. I'll be more boisterous here. There we go.

We've had a series of grants. The first one was for alternative fuel readiness planning. And the focus there was primarily electric. We've also had a hydrogen readiness plan recently completed this spring. And we've had an implementation plan to roll out the initial phase of our electric vehicle infrastructure.

So, all of that has proven to be very successful for that. And we appreciate the methodical logic that

the CEC set up, originally with their plan, implement, measure and adapt approach.

We're also glad that CALeVIP has shown up in our backyard. I think we were the third or fourth -- the fourth region. And we're over-subscribed, which is I think we were the first one, and I think that happened within 24 hours.

So, I think a lot of this, you can see the investment that the CEC has been able to make in our region has really created that leverage point so that we can then take advantage of additional funds. We have a very strong community interest. Because of this, we have an educated and aware community. And so, those funds can go places.

I think I want to leave as much time for Q&A as possible, so --

MR. OLSON: Okay, very good. And you're also touching on some things we want to wade into in a little bit more detail.

So, next, I'd like to introduce Ryan Harty, American Honda Motor Company. So, this is a slightly different view, but also involved in infrastructure.

MR. HARTY: Hi, I'm Ryan Harty, Manager of Connected and Environmental Business Development at Honda. You may all know Honda and the products we make,

but you may not know that our U.S. headquarters are here in California. And we're celebrating this year, 60 years since Honda was founded in the United States, so we're quite pleased about that.

Today, I'll be talking about a grant that we received for a workplace EV charging installation at our headquarters. Honda's overall goal, and my group's mission, is to reduce CO2 emissions of our total company by 50 percent, by 2050, from 2000 levels.

So, what that really means is each unit that we produce needs to be reduced by more than 90 percent for its entire lifecycle of greenhouse gas. Really, we will be implementing a strategy of product electrification. By 2030, we think about two-thirds of our products will be hybrids, plug-in hybrids, EVs and hydrogen fuel cell vehicles. So, this all needs infrastructure, which is why I'm here today.

I'll be talking, again, mostly about the EV charging infrastructure, but Honda is also very, very grateful for the role that CEC has played and, you know, other players here at the table have played with the hydrogen infrastructure and supports that scale-up and our customers' needs.

So, we received CEC grant ARV-13-058. We installed 60 EV charging stations, Level 2 EV charging

stations of ChargePoint equipment, on our Torrance campus. Torrance is our North American Sales, Marketing and Administration Headquarters, and about 2,500 people are working and stationed at that campus.

So, we began planning that, maybe back in about 2012. And at that time, there were only 7 EV drivers on our campus and none of them were driving Honda products, because they hadn't been released, yet.

As with most big companies, capital expenditure plans and planning cycles are really long, and it's kind of hard to spend money in big companies. You know, our company's very kind of capital constrained. We want to spend capital to make, you know, new auto plants, and expansions, and put them into parts distribution centers, and things like that.

So, when I asked for money to, you know, put EV charging on our campus, you know, top management has to look and rank that with every other need of capital.

And I think without the CEC's support, it would probably not have happened, or at least not have happened at that scale and in that time frame that we planned that installation. So, that was kind of key to me making the pitch to build a large EV infrastructure on our campus was the CEC support of that.

So, it took surprisingly long for us to complete

the planning, design and installation, but we finally completed those charging stations in January of 2016. And then, it took about six months for the usage to really start to increase. But we observed people looking at the stations. They saw the people who were using them, using them every day. And I think people got a kind of a recognition in their minds that, you know, this could work for me.

And since that time, so in just a little more than three years, today there's more than 463 unique users, using those charging stations on our campus. And so, that's kind of tremendous growth. The energy use has now flatlined. We're at full capacity. We can't deliver any more energy. And so, we're planning the expansion of that site.

When we surveyed the users, we asked them what was the number one factor in your decision to purchase or lease a plug-in vehicle? And we gave them a range of options about carpooling, access, and environmental benefits, and operating cost of EVs, and access to workplace charging. Eighty-seven percent of the respondents said that the number one consideration was the access to the workplace charging. That was their primary consideration for purchasing and leasing the EVs. Everything else was ancillary benefit that added

to their own benefit of having the EV.

We found that workplace charging -- you know, in our surveys of the users, workplace charging reduced the hurdle for customers to get into an EV. So, about 20 percent of users did not actually have any charging access at home. They were in multi-unit dwellings, or in rentals between -- you know, planning to move between units. And this gave people an opportunity to try it, without having to invest in their home charging station, or ask their landlord, or something like that.

And it also allowed a lot of people to push the range envelope of the car that they were driving so that, you know, they -- you know, we have a lot of people that have long commutes, and they were charging it at both ends in order to make the EV work for their lifestyle.

So, prior to this experience, though, I could not have imagined, I think, the magnitude and importance of workplace charging to the vehicle sales model. But now that I understand that, it's kind of going to be core to Honda's business strategy for EV sales moving forward. It really is one of the keys to scaling EV success in the future.

And then, we've done a lot of other, interesting fun things I hope I'll get a chance to talk about later.

We've installed 166 kilowatts of solar at that site, so 100 percent of the energy use of that site, actually about 200 percent today, is supplied by the onsite solar. And we've learned how to generate, and aggregate, and earn, and sell LCFS credits through that installation.

And so, all of those things really came out of the benefits of this EV charging installation. Thank you.

MR. OLSON: Okay, very good, Ryan, appreciate your comments and we'll wade into some of those other questions, too, here in a couple minutes.

So, now, I'd like to turn my attention to Richard Schorske. And, by the way, his organization is listed incorrectly here. He's with the Electric Vehicle Alliance, not the Silicon Valley Leadership Group Foundation. Even though he has worked with them under a grant agreement, but also several other entities. And we'd like him to explain some of that in his background.

MR. SCHORSKE: Thanks so much, Tim, appreciate that. Yeah, the EV Alliance was founded in 2009, not too long after ChargePoint. Also attended the first unveiling of the Leaf in Novato. I remember that quite well. Now, we have something to do.

And our mission was to accelerate the mass

adoption of EVs, with a focus here in California. We work on EV programs, planning, policy, infrastructure, fleets, and market acceleration generally.

On the planning side, we've done quite a number of the regional EV plans around the State, regional and local. San Francisco, Monterey Bay, Central Coast, Richmond, Ventura County most recently, Port of Long Beach finance aspects, all of which were funded by the CEC, plus some local match. Also, done some work abroad, in the Kingdom of Jordan, with ChargePoint as a matter of fact, and elsewhere.

In terms of best practices, we did the first statewide guidance document, the Ready Set Charge California Guide, the EV-ready communities, with a whole range of partners.

Another document on linking EVs, fast chargers, and storage to the grid, and strategies for EV charging in multi-unit developments in the Bay Area. And one of those was funded by CEC, I believe.

And in terms of market acceleration, we've been a big proponent of the regional EV councils. Put together a stakeholder coalition to found those councils and got CEC funding for them. I think there's eight or ten of those around the State, now. And we also founded the Bay Area EV Strategic Council.

One of the most interesting aspects of, I think of our acceleration strategies, has been trying to get local and regional players both resourcing, and paying attention to EV infrastructure. I think the State has really given a tremendous amount, but if you look at the total landscape, and air districts have as well, of course, but you see relatively uneven engagement by transportation agencies, metropolitan planning organizations, and cities, and counties.

So, we were fortunate enough to have the MTC, the Metropolitan Transportation Commission, in the Bay Area, devote about $15 million to an EV campaign, a set of strategies, actually some years ago and with a promise to do substantially more in the future. And we think that regional bonds, transportation and infrastructure bonds should be greened with EV infrastructure as a major component of that strategy. I think everyone's aware that many regions do multi-billion-dollar transportation bonds, and to do a huge benefit to EV infrastructure would be a very tiny fraction, literally single-digit percent of those bonds, if that was in fact on the radar screens of transportation agencies and MPOs. So, we think that's a huge opportunity.

We've also done a lot of work, lately, with

CCAs, most recently Silicon Valley Clean Energy, which is devoting about $8 million in the next couple of years to EV infrastructure. PCE, Peninsula Clean Energy is devoting about $12 million. And as you see, CCA's taking up, you know, 50 to 80 percent of the customer load in the next few years, we'll see Clean Power Alliance, and others, really, I think come to the table and follow the lead of, frankly, Redwood Coast, and Sonoma, and Marin who have also invested in EV. So, we see that as a big expansion of the pie.

We did a lot of work on infrastructure, ABAG and a bunch of partners in the Bay Area, we did 400 ports in 23 cities. ChargePoint was an important local partner. Bay Area and Central Coast Charge Ahead project, supported by the CEC, who's another 70, plus ports.

And then, an ongoing project that we have is the e-Fleet Accelerator Project, which we're really excited about. That's six counties. And it's very proactive outreach to public and private fleets. The larger fleets typically to answer all the questions that fleets have and to do an economic analysis down to the kind of vehicle level of, okay, what vehicle can we retire and electrify first? What is their infrastructure cost profile? What's the TCO, and the like?

And our observation is that fleets simply don't

have inhouse expertise on electric, yet, except for a few of the largest ones. And they really need some handholding and some encouragement to navigate the incentive programs, tackle the infrastructure, and so on. It's not enough to have just the vehicle incentives out there. As important as they are, there really needs to be a TA outreach that's quite proactive.

The same on the MUD front. We've done a number of projects in the MUD segment. One challenging project was trying to integrate storage, solar, and EVSE for multi-unit developments in San Francisco. Our local partner was Powertree Company that is focused just on that segment.

And, you know, like everybody else, we have some scars there in terms of just how tough it is to sustain, not only to engage, but especially to sustain MUD ownership willingness to set aside those parking spaces where they're shared or dedicated for EV over time, and to address the operating cost profile of EVSE which, you know, is a tough nut to crack for folks that are looking at the bottom line, you know, every minute.

So, one recommendation we have is the CEC take a page from the Hydrogen Program, and not just fund the infrastructure, but really look honestly at the fact that the business model for MUD is either broken or

doesn't really exist, to be blunt. And that folks need operating support while there's increased uptake, whether it's a shared or dedicated model for charging there. There's several years before you're going to get sufficient use of that charger to actually pay for itself. And I think that the model established for hydrogen fueling stations and just acknowledging the operating cost deficit is something that, you know, applies to MUD in particular.

I've probably used my five minutes, so I can come back later.

MR. OLSON: Thanks, Richard. Lots of stuff covered there in five minutes.

And our last speaker on this panel is Shane Stephens, with FirstElement. And so, you heard Larry's initial comment that we -- I thought it was a little more than 39 stations that are operating, but by the end of this year we think we're going to have 61, I think, total in the State, or somewhere close to that. And, of course, our goal near term is to get 100 stations on the ground and supporting several thousand hydrogen fuel cell vehicles.

And FirstElement is one of those companies that is a pioneer in this area. So, Shane, go ahead.

MR. STEPHENS: Thank you, Tim, appreciate that.

Hi, everybody, I'm Dr. Shane Stephens. I'm one of the founders of the FirstElement Fuel. And I'm especially excited to be here today because I moved to California 15 years ago to work on clean energy, and it's been quite a journey. And, you know, today I get to partner with the CEC and with industry leaders to build clean hydrogen stations in the State. And we eliminate gasoline miles, and we reduce CO2 in a significant way, and it's just very exciting.

So, FirstElement, we're a California-based company. We're small but growing. We're fully dedicated to development, ownership and operation of retail hydrogen stations.

And I want to be very clear up front, our company would not exist were it not for the California Energy Commission's program for deployment of hydrogen stations. So, you know, a big thank you to the CEC.

And, also, for the great work that staff does with us. You guys are a huge part of our success in the great work that you do. So, I see a bunch of you out there. Thank you, guys, so much.

So, we started our company, actually, with some seed financing from Toyota and from Honda, who are, you know, kind of two of the leaders bringing fuel cell vehicles to California. And then, we were able to use

that private capital as cost share to successfully compete for CEC grants to build hydrogen stations.

We built 19 hydrogen stations at an unprecedented speed and scale as a result of the first round of grant funding that we competed and were successful in. That created a statewide network of hydrogen stations across California. So, actually, a customer who buys a fuel cell car in San Diego, today, could drive to Lake Tahoe in one day, with nothing but a credit card and stopping at our hydrogen stations to fill up, five minutes at a time, at each fill.

I've now done that drive several times. But the first time I did it, I almost cried because I couldn't believe I could do that with just a credit card. Very cool. You know, didn't know when that day would come.

So, we have, you know, through our company created jobs within, but also outside through subcontractors. So, literally, you know, hundreds of California jobs in the process.

Internally, we actually have a very cool program for our field service representatives, our guys that work on the stations, and interface with the customers, and maintain them. We hire Veterans, primarily Marines. We find that they have a very good skill set for that. So, we have a great team that we're building.

And with those 19 stations open, we've now completed over 350,000 successful fills on fuel cell cars. We've eliminated over 78 million gasoline miles and replaced them with zero emission miles. We've avoided over 50 million pounds of CO2. So, we tend to talk in these numbers, 50 million pounds. That's the equivalent of planting a forest half the size of the City of San Francisco. So, think about that. CEC dollars, just on our 19 stations, displacing that kind of CO2, and we're just getting started. It's really impressive.

Another announcement, this is actually -- you're all the first to hear to it, we've actually secured 100 percent renewable hydrogen. So, from here going forward, we'll be able to reduce CO2 emissions even more aggressively with each fuel cell car that we fill.

So, these 19 stations are, you know, the first round of stations that we did. We're developing 12 more. And these first 19 stations are little tugboats. You know, they're doing great serving our customers, but we are having trouble keeping up with customer demand, frankly. You know, cars are being brought by Toyota and Honda, primarily, in a big way. Customers are driving the car as their primary vehicles, getting a lot of miles on them.

And the message from automakers to us is loud and clear that the retail hydrogen infrastructure is constraining the market and has the potential to constrain the volume of cars that they will bring. So, you know, I think we need to accelerate, and we need to scale up.

The good news is we've been laying the groundwork for that. The new, 12 stations that we're building as part of the CEC program have more fueling positions and more capacity, meaning that they can fuel more cars at a single station. We've been preparing for that scale. And as part of preparing and building for that scale, we're seen a doubling down of private investment.

So, I'll give two examples directly related to our company. We've had a Japanese company, Mitsui, and French Multinational, Air Liquide, both put money into our company in a big way. That's very exciting.

Maybe even more exciting is that they are investing across the hydrogen supply chain. Mitsui, I'll give one example, is invested in Hexagon, a company that makes hydrogen tanks, and investing in them in a big way.

Air Liquide actually is putting $150 million of private money into a new hydrogen production facility

dedicated for California's transportation sector. That's huge. I mean, that's one single investment.

And we all have to recognize in this room that that's because of CEC investments, right. Your investments laid the groundwork that's unlocking this private investment in a big way.

So, I think, you know, CEC, we really love the groundwork you guys have laid. Keep doing what you're doing. Keep doing more of your good work. And, you know, I think we're going to see the private sector come in, in bigger ways, with more investment. And, you know, we just have to keep up with the cars and keep encouraging the carmakers to bring fuel cell cars.

So, thank you.

MR. OLSON: Very good. Thank you, Shane.

So, at this point I'd like to go into question number 3. And so, part of this is we've heard -- I think you're representing a lot of the companies we deal with in terms of progress success. And I think we're close to over 150 different companies we work with, where money has been awarded, and projects deployed, and we couldn't -- we really couldn't get 150 people here today to speak, even though many wanted to.

But we're at this point where we've had this progress, some key ingredients for success, and these

things are moving at different maturity levels. Richard's point that there's a real integration step here that is happening or needs to happen. And we want to get into this kind of question of replication.

What's the potential to replicate either your individual companies, your entities, and can others learn from this process and help in that replication? Like in hydrogen, going above 100 fueling stations, trying to get that on the ground near term.

And as many of you know, in our electric vehicle passenger vehicle expectation is that we need 250,000 market-placed projects on the ground, charge points on the ground to support 5 million vehicles.

And I'd also like, as you go into this area in terms of replication, where, to the extent you have insights about this and are willing to share it, those submarkets that look like some growth areas of replication. So, the host sites, MUDs, residential, workplace, et cetera, corridors.

And then, in hydrogen, in hydrogen and electric, also the different, kind of going in -- we haven't talked about medium-duty, heavy-duty, where you think something might be going there, and any of the other kind of vehicle categories.

So, what I'd like to do is start with John

Schott, and then we'll go -- and then, I'd like to then go back, Shane, to you on the same question. John.

MR. SCHOTT: Sure. Thanks. So, absolutely I think, you know, again thanks to CEC support in those early years, especially, you know, we were able to grow and mature as a company. Those were very critical investments, you know, matched with private investments that we utilized to be able to grow our business.

And looking at where we've come in 12 years, you know, we now have approximately 100,000 EV charging spots in North America, and about 700 employees that are strictly dedicated to EV charging. That is our entire business. That's all we do.

But I think, you know, in terms of replicating success, you know, one project that I did leave out, not intentionally, when I was talking about all the different projects that we've worked closely with the CEC and other partners on, thanks to, you know, grant support, is a $13 million project that ChargePoint is currently embarking on to install and electrify California's corridors. Both the north/south and completing the West Coast Electric Highway, and the Interregional Corridors.

It's a very complex project. It's taking a long time. There are administrative challenges, but we are

working closely with the CEC to overcome those and demonstrate success and build out a network of DC fast chargers across the State, linking to other states as well. But ChargePoint can only handle so many of these projects. You know, again, there's a lot of administration that goes along with it.

So, I think, you know, again, to pivot back to the CALeVIP model, you know, I recall the first workshop that was created and hosted by the CEC to discuss this new model that they were soliciting input and feedback on. Really, changing how the ARFVTP program, as it was called at that time, was going to work and operate. And I think there was some concern on our part exactly what that would look like.

But now, you know, kind of having come through the other side I think, you know, we couldn't be more thrilled about the model that has been built and the first initial programs, or projects that have been created and successfully rolled out across the State.

And excited to see what 2020 brings and 2021, and future years.

So, I think, you know, the great work that Andy and his team are doing, working with Brian Fauble and other staff at the Energy Commission to develop and replicate this model to make sure that investments

aren't just directed to where the drivers are today, but to make sure that we're directing investments into disadvantaged communities.

And I think looking at the very first project under CALeVIP, that was launched in Fresno County, was a great sign of that dedication and support to making sure that they're directing investments into the right places.

Again, Dana, you mentioned about, you know, the program that launched in Humboldt, Shasta, and Tehama Counties, and the tremendous support and demand for those incentives instantaneously, you know, that we saw. Again, replicating that across the country, you know, as we are going and talking with other state entities, importing back to California on what they're doing is something that I do on a daily basis.

So, just to kind of pivot and talk about, you know -- you mentioned medium- and heavy-duty vehicles. You know, we're starting to see the vehicles in those categories, you know, proliferate. You know, there have been some aggressive goals and mandates set.

We're going to need a similar focus and approach to not just ensuring that, you know, you get a bus, you get a charger. That only works, you know, for kind of those first, initial vehicles. But that we really have

a comprehensive approach and strategy to building out, you know, depots of charging infrastructure for these fleet vehicles as you see transit agencies, school districts, shuttle buses, and other medium- and heavy-duty vehicles looking to electrify their fleets.

So, we look forward to engaging with the CEC and other stakeholders in processes to ensure that we're building out infrastructure that can effectively support those subcategories in the market as well.

MR. OLSON: Okay, thank you, John.

I'm going to ask Shane to go next. But let me just also mention we're going to do a -- for this panel session, we're going to do public comments just before noon. If you have a public comment that you want to make, fill out this blue card or we can -- raise your hand when we're at that point. But this would be a good way to give us your card here. They're available on the back table, I think, for you.

Okay, Shane, the same question.

MR. STEPHENS: Yeah, I think it's a really important question because at the end of the day you need create a healthy market, with multiple players, and have an off-ramp for government subsidies. Right, there's plenty of examples where industry sector gets going, and then it's like the subsidies keep going and,

you know, we continue asking for new and creative ways for subsidies.

So, I think, you know, a couple really good things for hydrogen. So, at First Element, we see an exit ramp for government subsidies. And we think that's in the late 2020s. We think that's with about 250,000, you know, fuel cell vehicles on the road.

I hope to be back here talking to you, Tim, and to your Commissioners about how we start sunsetting, right, subsidies.

I think, you know, we will need a push beyond that. I think having, you know, good agency support, you know, having the CEC continue its efforts is going to be really important.

The ARB, of course, is a great partner with the CEC and between the two agencies, you know, the collective policy landscape there is very good for the development of hydrogen over the next several years.

I think there's a new LCFS capacity credit program that exists for both hydrogen and EV charging, actually, that's going to be, you know, key to helping us get over that hump until the late 2020s.

I would like to see more interagency coordination, you know, and more consistency. In terms of, you know, saying all right, we're going to go toward

ZEVs. You know, hydrogen is a part of the ZEV strategy. And let's not send mixed signals.

You know, the PUC, for example, I think could be doing more on hydrogen. You know, not to name names, but I guess I just did. You know, some of the programs at the Treasurer's Office or at the Board of Equalization, which now has a new name and I forget what it is. You know, we'd like to see more consistency to support hydrogen across all those agencies.

I think, you know, the other big thing that we see is, you know, again, private investment coming in, in a big way. Doubling down, coming in, in a bigger way. But also, more companies getting involved in the development of hydrogen stations and in a very exciting way. Shell, for example, a big oil company getting involved in the development of hydrogen stations.

You know, I think that kind of diversity in the marketplace, that kind of branding in the marketplace is a very good thing.

So, I think there is a role for multiple players. I think there's an exit ramp for government subsidies. And I'm just talking about the light-duty sector here, right, light-duty vehicles.

So, you mentioned medium- and heavy-duty as well, which I'll touch on. First, to say, you know, our

company I think remains very focused on light duty. As I mentioned in my intro, we're having trouble keeping up with that, right. So, I think we need to do our job. Keep encouraging carmakers to bring those cars, keep up, have the development of the infrastructure be an encouragement and not a discouragement, right, to more of those vehicles coming out on the road.

The other thing I'll say is that, you know, with medium- and heavy-duty, again, there's a business case here for hydrogen with volumes. Right, so if you can get fleet commitments, right, so you can get a fleet of buses, a fleet of trucks with some kind of commitment of I'm going to use this much hydrogen, this really starts to be less important to do subsidies on the infrastructure side, right. So, you know, again, we're not really focused in this sector. But, you know, if somebody came to us and said, hey, we have, you know, ten heavy-duty trucks and its going to use this much hydrogen, you know, I could pencil you out a business model right now and say this is what we'd have to charge you. And I don't need any subsidies, right? Subsidies might help bring down that cost a little bit.

So, I think, you know, it's very exciting. There's a business case here with hydrogen. Of course, with light-duty, you know, it's a little bit more of a

challenge because you have to build infrastructure out ahead of the cars a little bit, right? So, there's going to be a waiting period. But again, in the late 2020s we see an off-ramp for that.

MR. OLSON: Okay. So, I'd like to kind of pose the same question. Andy, you have your finger on the pulse of a lot of things going on in this area. And this question of replication, you're seeing right now, as you start putting out tranches of money, that you're getting uptake pretty immediately. And this is still a first come, first served, right? It's that kind of approach. So, what's your sense about replication?

And then, I'd like to follow with Richard, and then Dana, and finally Ryan on the same comment.

MR. HOSKINSON: Yeah, great. So, I think, well, the first thing to note is the way that CEC and staff conceived of CALeVIP. It's designed to be replicable. In fact, it's, in essence, and umbrella for these repeatable, targeted incentive projects. And I think the fact that four of them have released within 22 months, along with the actual -- just the basic creation of CALeVIP in that time frame, as well, kind of speak to that replicability already.

I think it goes more than that, though. It's also set up and I think what's required is a degree of

improvement, continuous improvement. Some of the other speakers here, Richard in particular, noted the need for pulling in additional local investment. The diversification of engagement and investment in that infrastructure. And I think he noted some CCAs, public-owned utilities, and metropolitan planning organizations as examples.

CALeVIP has seen some early success with that, and which I think is not only replicable, but can be accelerated as well.

So, on the Sacramento County Incentive project there is the ability to partner with SMUD, again just focused on the light-duty efforts there. Where, instead of multiple incentive projects in that reason, they're only going to put one. So, the noise or confusion to potential applications was reduced as well, again helping to facilitate speed of action in the marketplace, which we all know is what's necessary, especially at this still, relatively early time frame.

Something else to note as far as an improvement to the launch of additional CALeVIP type projects is the need to ensure that it's intelligently done. Both Richard and John spoke to this in varying degrees. The planning efforts that Richard noted have occurred, that CEC has generously funded, and intelligently funded

early on, have been something as Dana had noted, really ready a region to take that action. Those plans cover most of California, but they're also dated as the technology has changed.

So, in looking at replicating that future of success that we've seen, there probably should be some consideration as well to the steps that were put in place to create the factors that led to the success. And I think planning is one aspect that did so, and we have some evidence to that.

And then, I think John had noted the success in the Fresno County Incentive project where a little over 60 percent of the currently allocated funds are going to disadvantaged communities. And that's above the currently set standard that the Energy Commission has put forth of 25 percent of a minimum investment in disadvantaged communities.

In all of the project areas where we have that reportable data, Fresno, Southern California, four counties there, and in Sacramento, that 25 percent threshold's already been exceeded. And while that is, I think, a success that has been replicated, again I think continuous improvement there can be employed.

And where we're looking at models that I think, just much like EV Alliance, relies on lots of smart

partnerships, I think that partnership model with the right community-based organizations and local actors will increase the engagement in future projects, and allow for under-served communities, communities of concern to be able to voice their needs, specifically, and designed to be further improved to really deliver direct benefits that they're looking for.

MR. OLSON: Okay, Richard, you have any other insights to add to this topic, this question?

MR. SCHORSKE: Yeah, I just wanted to mention two things pertaining to the fleet domain. First of all, I think that everybody's observed that there's really uneven allocation of resources from IOUs by region, and by IOU territory, I guess I should say, and in terms of program design.

I think it's fantastic that, you know, the CPUC has encouraged rate-basing of infrastructure and that the IOUs are focusing, in many cases, on medium- and heavy-duty.

But the constraints that, you know, transit agencies who are looking at bus electrification, and medium- and heavy-duty, you know, fleet delivery and so forth are looking at is just some really massive first costs and then it's kind of done. You know, the electrical upgrade costs are one and done, for the most

part on those fleets. But they're really a serious obstacle for those that can't access the incentives, or where the incentive budget just isn't sufficient.

But I think, you know, some of this is in the CARB bucket, obviously, and also the CPUC bucket. But as far as, you know, CEC's role in planning, and also resource allocation, if there was some way to really assess this more comprehensively to understand the unevenness of the resourcing and, you know, what the gap is in terms of the total need I think that would be quite helpful. And, also, help to guide CCA investments as they get more program authority and resources to do work themselves, on the fleet side.

And then on the VGI, I just wanted to mention a couple of things. My sister organization ZNE Alliance, has a couple of VGI projects in Antelope Valley, E-bus-to-Grid Integration Project. And we're also a partner in the VTA Project, led by Prospect Silicon Valley, a similar project. And those are trying to basically manage charging for these large fleets of E-buses that are coming online.

And in the school bus electrification world, that is, by everybody's assessment, the best use case for V2G, in particular. And just because they're there in the summertime all day, and they also have a good

profile for daily and weekend use as resources to the grid.

And there, there's a number of barriers that I think CEC could address already. The Prop. 39 funding helped with just the initial bus purchase. Obviously, the HVIP is great. But to actually incent full participation in VGI, and V2G, specifically for school buses, there needs to be, again, some upfront incentive for the districts to take on the complexity and for qualified intermediators, and systems integrators and, you know, EVSE companies to get in there and do the work to get to commercial scale integration, not just pilot projects.

So, I think there's a huge benefit, the grid benefits and the stakeholder benefits, generally, are basically proven on a school bus, a V2G with the price points that we're hearing for V2G enablement of school buses. So, I think there's just huge opportunity to just vault forward and have most, and not just a few, school districts be V2G enabled for electric buses.

MR. OLSON: Okay, very good. Thanks for raising that point. And just kind of related to that, the Air Resources Board has asked us to consider allocating money for a lot of the -- through March 1st, 2019 the HVIP Program, and some other ARB funds have incentivized

1,713 medium-duty, heavy-duty vehicles throughout the State. With build times of 400 to 600 days, and a very significant shortfall and money allocated for infrastructure.

And, so, we're weighing that and what the method is to deploy money. And in conjunction with utilities, probably a more closer coordinated program.

And, but we'd like to hear some comments on our record about the need for that. So, good that you're raising it here, but this is a comment for all parties here. We need to get some things in writing stating what that need is and a desire for some allocation of money in this area.

And, also, you touched on another point and that's the tracking of what's gone on. And we're seeing a -- with light-duty, there are lots of ways of tracking information from our DMV database, and lots of different entities are tracking that. With medium duty, heavy-duty, it's a really hit and miss kind of source of data. And we think that that would be a good recommendation to us, that we need to set up something like that.

Okay, so Dana, I'd like you to kind of comment on that and that we've raised this planning things. So, we look at Redwood Coast as kind of an illustration of kind of an integrated, CCA, utility function, and also

your success in how you've planned this out, the strategies you've come up with. And you have kind of a limited physical, geographic territory there, but is that also replicable throughout not only in your area, but through other areas in California?

MR. BOUDREAU: I'm glad you saved an easy question for me. I'm going to focus on the rural question because we are rural and that's the majority of the topology in California.

Workplace charging is challenging simply because the workplaces are small, very limited infrastructure. Residential charging is challenging because most of the built environment was established before the Energy Codes of 1974. So, we just don't have the electrical capacity at homes and it's very expensive to do a panel upgrade, as well as install the equipment in the first place for charging.

So, our focus is really on public charging. And from a revenue perspective, getting the private entities to invest, they pretty much need to see a solid revenue proposal for that to be logical.

So, in our case, we're a regional energy office and there are only two of those established in the State. But the Community Choice Aggregation programs are in many ways a very similar type of style, where the

initiatives are similar, the motivating factors are similar. So, I think that where there is a CCA in place, they can serve as a proxy for a regional energy office.

And there's some interesting things that come into play, getting just beyond supporting transportation electrification because they have other initiatives, such as demand response. And if you can build out a network of EV charging, suddenly you have economy of scale where you can do demand response.

I forgot to mention we pay a slight premium, so our network is 100 percent renewable, and we've done that from day one. So, that also allows us to accelerate renewable energy adoption for our region.

Vehicle to grid, obviously we're going to need a relatively robust grid for that to work. And we also need to be able to aggregate vehicles for it to be a large enough player for the California Independent System Operator to be able to engage with. So, aggregation's going to have to be key.

And I think that a local government agency is probably better connected with State level players to initiate those types of activities. Whereas, if you're a hotel chain, for example, you might not necessarily have the same motivation.

Did I miss anything?

MR. OLSON: That's good. I happen to own a hotel. I know exactly what you mean.

So, Ryan, do you have any other comments you want to add to this before we get into the other questions?

MR. HARTY: Yeah, sure. On the topic of replication, so for Honda, we have 67 facilities across the United States, parts centers, and offices, and whatnot, and manufacturing sites, and R&D centers. We also have about 1,300 automobile dealers across the U.S.

And so, based on our experience with the workplace charging project that we did, we developed kind of a short guide to workplace charging, as well as a small capital pool to seed installations.

And so, we've developed workplace charging sites at Honda R&D in Ohio, at the Honda transmission manufacturing plant in Ohio, at the Marysville auto plant support office, and the R&D centers in L.A., and several of the parts centers.

And without the experience, you know, people don't like to make decisions. Those facility managers like to come, and they like to look, and they like to play and touch with the things. They like to plug in cars and see what happens and stand in a puddle and not

get shocked, and things like that. And so, having that experience is key to promoting and replicating these successes.

So, in addition we created a program at American Honda to assist our dealers with installing EV charging. So, just for their service bays to support the sales and service of the cars taht they've sold, but also public, public Level 2, we've installed ChargePoint EVSEs out front. So, any customer within the ChargePoint network can find the stations and use them.

And that really supports when it's the idea of public charging, where a customer can see a product being charged. They see the station, and something just click in their mind and they think, ah, this can work for me. And then, they consider the purchase of the next electric vehicle, something will change. But if they don't have that actual experience seeing, and feeling, and touching EV charging, it's somehow abstract and they won't think about, they won't even consider purchasing an EV for the next time around.

So, all of those sites at the dealers then also become workplace charging for those employees. An average Honda dealer supports maybe 50 to 100 employees. That's a large employment footprint, then, that becomes exposed to EV charging. So, we've replicated in that

way.

I think moving forward with replication at, you know, MUDs and I think, you know, private worksites, corporate worksites. This is really challenging, and it will have, should have a role for CEC. I know Richard talked about the business model of EV charging. And today, you know, most workplaces that install workplace charging, it's either kind of a form, a little bit of corporate charity, or a -- you know, the CEO got a Tesla and they want to plug it in at work. And so, the facilities guy goes, and they hook it up, and make that happen.

But, really, from the business owner perspective, there's no return. There's no return on capital. If they're going to install a substantial amount of money in EV charging at their corporate site, that model needs to return some capital to them. Even soda vending machines actually generate profits for the treasury of most small companies.

And so, to do that, that the whole EV charging business model needs work. So, hardware needs to be reduced in cost. The installation processes, and methods, and materials need cost reduction. The networking and data access needs cost reduction. The revenue model and the ways of charging and community the

value of charging to the customers, who are going to use it, needs to be improved.

Demand charges. At our site in Torrance, we got, I think, a 5-year demand charge waiver based on our SCE rate. And that's key to the value proposition of that at our site. The demand charges, themselves, are maybe more than 50 percent of the cost of the energy for EV charging.

And if you're a MUD owner, you just look at that and say, no, we're not going to install EV charging because we're going to get hit by these demand charges, and the costs greatly outweigh the benefits. So, that needs a lot of work.

Until EV charging can be a profitable venture for any site owner to install it, or EV charging is a service that's provided that's profitable to that company that provides that service, we can't scale. We can't scale the business. And then, if we can't scale the EV charging business, you can't scale the EV sales business. So, that's going to be challenging. There's going to be roles for CEC programs to spur investments in those areas.

From the -- going back to the value proposition of EVs and EV charging, we think V2G has a big role to play, both for helping worksites to manage demand

charges at their sites, but also enabling, you know, kind of the vast array of different potential grid services and energy arbitrage from vehicles. Having a tremendous integrated network of distributed energy storage devices, and being able to unlock the potential to, you know, increase the amount of renewable energy that the electric grid can integrate by having this distributed, dispatchable, energy storage and energy, you know, charging resource at our hands I think can both scale renewable energy, but EV charging at the site.

So, getting some of those values back to the site hosts who install EV charging at their workplaces, at the MUDs, along the street for cities that are considering installing EV charging for, you know, residential areas with street charging, that all needs work and support.

So, I think I'm very much looking forward to participating in programs and guidelines that can develop that as a successful business in the U.S. or in California.

MR. OLSON: Very good. So, what I'd like to do now, and on the question -- I'm going to kind of combine question 4 and 5 here. We've talked, I think we've already talked about some of the things you're -- your

insights and some of the recommended actions.

But what I'd like to do is quickly go through each of the panel members, starting with Andy, and then going around the table here, and I'd like to do it this way for question 4. We're asking, what do you recommend to the Energy Commission, the State of California on government actions that are needed going forward?

But I'd like to do this in -- because you touched on some of this already, I'd like you to do this, this way: What are the top two or three things you would recommend to us and, in fact, we'd like to see this in writing to us, too, to not only the panel members, but everybody here that would -- is needed to expand, increase the growth of this area.

And then, I'd like you to touch on another topic, just slightly on Number 5, and that's what idea, what kind of key idea do you have to spur private capital? So, using our money as maybe a foundation, what can we do differently that would spur more private investment with that?

So, let's try to -- you don't have to go into great detail, just like the top two or three things, and then an idea on the private financing. Andy, first.

MR. HOSKINSON: Great. Yeah, so sort of bullet points on this. We just heard that scale's hard to get

to and there's a multitude of things that are needed to get to that. Funding, I think is one of the things. It's always part of it. I know we are looking at a future, ultimately, where you need the models to work off that, but we're not there at this point. In fact, we're significantly behind in electric vehicle infrastructure where we need to be.

And the more we can leverage the funding earlier I think that that can create momentum for the future to accelerate to the time when you don't need it. That's more important, I believe, in the times we're in because of the waning of that role focus and support toward this. If we're going to achieve cost reductions and we're going to achieve scale, California's going to have to lead more than ever. They're going to have to step up beyond what's been a leadership position and fill some of the void, I think, that's being created there by some of the lack of federal focus.

There were -- looking at cost barriers to that, there's quite a bit that the Energy Commission, I think, along with other agencies is already working on. Things such as, I know it seems small, but the difficulty of getting through a permitting process, and the cost of getting through a permitting process.

And that, really, truly with some focus and

interagency cooperation that the Energy Commission is, I think, promulgating here is something that can be addressed and can help the situation.

Looking at the leverage private capital, I know we've seen not private capital, but we've seen the catalyzed capital from other local organizations, CCAs, MPOs. I think that there's that component that we've been able to show that, too.

I think taking that model and working with other, possibly automakers, who have a very serious invested interest on targeted infrastructure projects could be something worthwhile looking at, as far as the marrying of certain private capital with the benefits already derived from CALeVIP for instance.

MR. OLSON: Okay, Ryan, the same question.

MR. HARTY: Sure.

MR. OLSON: The top two or three things on how we should deploy our money and then an idea on how to spur more private capital and flow.

MR. HARTY: So, I think efforts to make EV charging profitable for the site host and there can be a huge array of things that go into that, between hardware and networking system cost reductions towards, you know, reducing the cost and improving the value for the site.

An example of that would be, say, promoting EV

charging installation during new construction. So, in our dealer program, we found that installing EV charging at a dealer site is one-tenth the cost when it's designed in from plan to the beginning of the building versus going in and retrofitting the building.

And even if you have a situation where there's some other minor electrical work going on, on the site, just the overhead of getting the electrical contractor to the site is a lot of money. So, if there was a means of promoting EV charging installation at the same time as other electrical work. So, for example, let's say somebody's contractor shows up the City of Long Beach permitting desk, looking to install a new circuit to add a new light outside, the cost of also running a new circuit for an EV charging at that time would be, you know, very small compared to if somebody just tried to pull a permit to install an EV charging.

And so, kind of trying to tie programs together in an integrated way, to offer an incentive at the municipal permitting desk level and, you know, the electrical contractor level. When they're selling an electrical service to a customer, to be able to say, hey, we've also got the CEC rebate that we can apply here to cover the cost of an EV charging circuit install. Would you like me to do that for you? And

just bringing those things together to massively reduce the cost of installing EV charging at residential, MUDs, and worksites I think would go a long, long way. That's all I've got right now.

MR. OLSON: Okay. All right, so Shane, switching gears again back to hydrogen, what's your comment there?

MR. STEPHENS: Yes, I think, you know, the good news is I think we're doing a lot of things right. I think if I have some recommendations, I would say encourage a scaling up of the infrastructure today. You know, in the first round of stations that we built with you guys, we put the best technology available at that time out there.

We've actually invested some of the company's private money to upgrade those stations, to squeak out more capacity, you know, over the years as much as we can. But we're seeing the limitations of that, right.

So, I think now we have technology that can scale, and I think we need to encourage investment in that technology. It both, you know, puts infrastructure in place that can support a lot of vehicles over the years, but it also quickens the offramp to subsidies, right? Because a weakened scale is an industry the offramp for subsidies happen sooner.

And I think related to that, you know, think ten years out, right. Let's not think three years from now, five years from now. You know, I think there's probably many people at this panel here that can attest to the fact that development of anything in California is difficult. There's a lot of permitting processes. It takes time. You know, frankly, five years go by in a blink of an eye. We started our company six years ago. I can't believe it. You know, so we should be thinking ten years out.

And I kind of already alluded to this before, but I think be consistent, right. I think be consistent. And this goes beyond the CEC. I think the CEC has been consistent, right. But I think be consistent in your messaging and a balanced approach of ZEV technologies. Be consistent across agencies, you know, to the extent that we can.

You know, follow through on the Governor's Executive Order on ZEV infrastructure to the extent that we can. Right. I think the Governor put out a very balanced Executive Order and then the Legislature was very unbalanced in its approach of how to attack that Executive Order and dealt with it.

And then, to transition to the kind point of your question about private investment. I think all of

these things will help private investment. And I think it's happening right now, right. So, again, I'll repeat, we're seeing a doubling -- I say a doubling down. It's probably more of a tripling or quadrupling down of private investment in hydrogen infrastructure and the supply chain for hydrogen in the transportation sector.

So, I think, you know, we have to continue to be consistent, to be encouraging. If you start to -- private investment can get cold feet and start to decrease really quickly, if you start sending mixed signals, right. So, I think those are the keys. And, you know, I think it's a recipe for success. You know, I think we have a lot of the policy mechanisms in place that we need to get hydrogen infrastructure to a successful place. I think we have to use them faster. I think we have to encourage scaling up faster.

And, you know, we're always in discussions as an industry to see is there something else in the policy landscape that will also help or that we also need? But I think we're -- you know, we have a couple of really good tools right now and one of those good tools in the Clean Transportation Fund. It's very critical to us and, you know, it's playing a huge role in helping us accomplish, you know, a self-sustaining retail hydrogen

infrastructure.

MR. OLSON: Okay, very good.

Richard, to you have a comment on that, your top kind of two, three things on how we should deploy our money? And then, any comment on private capital.

MR. SCHORSKE: Yeah, I think there's a couple of really exciting things that are happening in the finance area. One of them is that as a service, sort of bundled approaches where you have mobility as a service infrastructure, as a service and the like, I'm not sure that the CEC has fully, you know, assessed the implications of those from a grant-making perspective and how to encourage stakeholders to really take advantage of those mechanisms.

There's a number of new companies in the space. Amply, Island Electric, In Charge [Canoo] and others, I'm sure are going to be deploying these approaches. But effectively, what they do is spread out the hit on the infrastructure for ten plus years and give folks a chance to really take the most advantage of managed charging, and good service revenues to help finance that infrastructure over a longer time frame, and to levelize the cost of energy, and give more cost certainty at the same time. So, those are really helpful approaches.

And, you know, I don't know what the CEC role is

here but, you know, I think somebody needs to circle up the transportation agencies in the State and say, you know, if you're going to spend $5 billion on highways, how about spending $50 million on EV charging infrastructure, you know, while you're repaving the roads, or whatever the case may be.

MR. OLSON: Good recommendation to us, Rick.

MR. SCHORSKE: Yeah, right now that isn't just happening consistently and it's absolutely nutty that it's not.

And then, on the utility side, I think, you know, to get utilities engaged more with VGI there needs to be just a more holistic kind of market acceleration strategy around V2G and VGI.

One example would be an adder in the HVIP for VGI or V2G enablement on both the vehicle side and the charger side would be super helpful. Two-way vehicle charger standards, of course, are proceeding. But, you know, a mandate is under discussion. I think it needs to happen soon. And, you know, it doesn't have to be a higher cost. It really should not be. It's just, you know, at some point it's just going to be a circuit board and not a lot more than that.

And then, again, a legislative approach, AB 676, which is still pending, is effectively a flexible load,

you know, VGI mandate. And I think CEC could really help inform how that works. I think the legislation is proposed, which has passed the Assembly, I gather, but not the Senate, is -- just kind of punts it over to the CPUC to determine how that should work. And I think it needs to be maybe a multi-agency consideration because it's so important.

So, those are some suggestions that are both finance and policy. Thanks.

MR. OLSON: Very good.

So, Dana, do you have any comments on this area, your top two, three things that --

MR. BOUDREAU: Yes. I think just to echo one of the last points that we really need to consider the size of the task. For our region, transportation is about half of our decarbonization challenge and the funding is just not scaling to address that need.

So, back to legislation and how do we -- you know, do we tackle transportation funds for highway construction and so on? Just how many roads do we need? Maybe we'll get to that later.

This one's a little odd. I'm just going to focus on rural for this one. It's equitability. ADA is a really important, essential societal right, but it's a major barrier for a rural setting where parking

infrastructure is extremely constrained. So, I don't know how we fix that, but some examination is needed there.

Related to that, CalEnviroScreen is a really powerful tool and it's addressing environmental justice, which is a critical topic, developed over the last 40 years or more. But it needs to be applied judiciously because it's precluding disadvantaged communities that have clean environments, of which Humboldt County is one of those. So, if we want to have a broader initiative, we need to use a more broad tool.

And then, just the third one that I have here is operating and maintenance costs. Recurring fees are a real challenge. It's pretty much like software's a service. Every month you have a lot of fiscal mouths to feed and that creates a lot of overhead, and it means you have to bring in a lot of revenue in order to maintain the system. And that means that you're only going to be going into dense high occupancy, or high utilization locations, which is not necessarily where you may need to have stations during early roll out. So, perhaps some value engineering on the entire business model would be a useful study area.

The DOE did that with their SunShot program for solar installation. So, perhaps replicating some of

what they did there.

As far as private capital, I've got a bit of a blank on that one. I'm going to need to think about it some more. Just off the top of my head, I think that storage and vehicle-to-grid is going to create new business opportunities that could be very attractive to the private sector. Particularly, when we start rolling out time-of-use rates, which is going to create more dynamic pricing and, therefore, more flexible business opportunities for the immediacy of vehicle storage.

MR. OLSON: Okay, very good.

And John Schott, your sum up comments on what we should be focused on.

MR. SCHOTT: Thanks. The first thing that I'll touch upon has already been first addressed by Andy. But, you know, streamlining of the permitting process. I'll mention that, you know, GO-Biz, just a couple of days ago released an electric vehicle charging station permitting guidebook, a great first step. But, you know, just for example in, you know, some of the initial projects rolled out by the Energy Commission, and CSE, you know, we have customers in Fresno County and Southern California that are ready to give up their projects because they can't get through permitting.

Again, you know, these folks are resource

constrained. They're not coming from a bad place; they just don't understand it. There's not a lot of guidance to help them through the process. But it is both, you know, slowing down the level of deploying infrastructure and encouraging private investment into EV charging stations.

I'll just mention, we had one of the first DC fast charging sites that we completed under the California Corridors project. At the end, near final inspection, we had a different inspector come that told us that we needed to regrade the entire parking lot in order to meet ADA requirements, and it was a $30,000 hit.

So, those types of things, you know, make it very challenging and difficult for, you know, companies like ChargePoint. Others, you know, private investment into these areas.

The second think I'll mention is demand charges, the operating expenses, which somebody's already also mentioned. You know, we support efforts that are underway, you know, with the CPUC and all the IOUS, and other agencies to, you know, making sure that utilities are designing demand charges and rate that are taking EV charging into consideration. You know, the demand charge rates that we have today they, of course, weren't

designed way back when, when they were created. You know, the thing about DC fast chargers. And, you know, right now at the level of adoption that we have in California, although it's great and certainly we're a leader, in the nation, you know, fast chargers are only seeing a handful of sessions a day, at most. And there's just not enough session and utilization activity to be able to afford those monthly demand charges.

I think Ryan, you mentioned, you know, the demand charge relief that you guys were provided for a few years. So, things like that are great interim solutions but we need, you know, longer-term, sustainable demand charges to make sure that we can get private investment into electric vehicle charging infrastructure. So, that touches on your second question.

The last thing that I would mention specifically on, you know encouraging private investment, again, I know the CALeVIP program, limited resources, there's a lot to do right now. So, you guys need to make certain decisions about how those funds are directed. And right now, the DC fast charger incentives are, you know, directed towards infrastructure that's open and accessible to the public. It makes a lot of sense.

In the future, you know, I think we need some

incentives for DC fast chargers that can be restricted access, either for, you know, depots and fleets, but also for light-duty fleets. You know, we look at the TNC companies, like Uber and Lyft, you know, we're seeing some traction in those areas where, you know, drivers are adopting electric vehicles. And those companies have programs to help encourage adoption. But they need to make sure they can DC fast charge where it's convenient, where it's convenient, and they can pull up, charge, and then get back on the road so that they can, you know, continue to make a living.

So, those are the three things that I'll mention.

MR. OLSON: Very good. Okay, so, we're not going to have time to go into detail on all the rest of the questions. We want to give you, each one of you just one -- any additional point you want to make or emphasize very quickly, and then we'd like to go into some public comment.

So, let's start with Shane and go around the table, and Richard, you'll be the closer. Any single point that wasn't mentioned, you could go into whatever is, utility integration, or whatever is.

MR. STEPHENS: Yeah, I want to encourage the CEC on, you know, I think something you guys have done very

well on the hydrogen program over the years, which is to listen to industry and keep that dialogue going. You know, I think we've made tweaks and evolutions to the solicitation process and program. The most recent one, I think, or at least based on what we've seen in the draft solicitation, represents, you know, a pretty big evolution, and it was in response to industry request. So, I think that's extremely important. That's what's helping kind of unlock some of the scale in private investment that you're seeing. So, I want to be encouraging to that and say keep doing that is, I think, a very important thing.

MR. OLSON: And Ryan?

MR. STEPHENS: Thanks. I think vehicle grid integration, including V2G is one of the most important topics to making both EVs scalable in California, renewable energy scalable in California, and EV charging as a kind of break even or profitable thing for companies to invest in to make that work.

And so, accelerating efforts towards adoption of V2G, both from, you know, hardware standards, communication standards, and system integration standards with coordinated efforts between the CEC, the CPUC, you know, ARB with LCFS credit and things like that. Developing an integrated framework towards

accelerating V2G is, I think -- would be a tremendous effort, with tremendous impact to California.

MR. OLSON: Very good.

Andy, what key point do you want to leave with us that hasn't been addressed or you want to emphasize?

MR. HOSKINSON: I'm going to emphasize here. I think we've made comments earlier and Ryan just, really, I think spoke to it. First, I want to commend the Energy Commission for already focusing on demand enabled EV infrastructure. You've been pushing the boundaries, I think, of the technology. And I think that needs to continue because it does -- it's what's going to open future business models that I think are going to lead to that scalability we've been talking about.

It's also needed because it's going to lead to the customer experience that mass adoption requires. So, I'm going to emphasize that, I think.

MR. OLSON: Okay, John, what key point would you like to make?

MR. SCHOTT: Yeah, so the one thing I think I'll touch on is, you know, again, the CALeVIP program. I think that is -- the model of that program is the right model to help achieve the very ambitious goals that have been put forth here in the State of California.

Of course, there's always going to be a need for

more funding, so we'd like to see these great programs continue to be funded, you know, throughout the end of 2023 and well beyond that, of course.

And it is a great model. I mentioned that we try to replicate that across the country, educating other states that are looking to develop programs of their own. But always thinking about ways in which, you know, we can tweak and make improvements to the program structure to adapt to the evolving EV charging industry.

Richard, you know, talked about new business models and, specifically, charging as a service. That's something that ChargePoint has been offering for over a year. We're starting to get a lot of traction with that program and have been doing very large deals with retail customers, municipal customers, and even fleets. You know, thinking about how that can fit into a program, like CALeVIP, where we have customers who aren't purchasing the equipment outright, but they're leasing it and getting, sort of an easy annual payment, kind of a lump sum for the hardware, the network services, and the maintenance agreement that go along with that.

And then, also, thinking about how do we, you know, use this program framework that's been created to serve the medium- and heavy-duty vehicles. Again, touched on that earlier. But I think that could serve

as a good model for thinking about how to support, again, the ambitious goals that have been set by the State, and the work that CARB is doing with HVIP, and future programs to help provide funding for the electrification of fleets. Thanks.

MR. OLSON: Dana, your key point.

MR. BOUDREAU: I'm going to play a wild card. One of the things that keeps me up at night is spilled renewable energy. And so, for me, what can transportation do to take advantage of that?

Can we co-locate hydrogen electrolyzing equipment at points where we have excess renewables? Can that be used to then power medium- and heavy-duty fleets along corridors? Just an out-of-the-blue concept. So, storage, effectively, to address the duck curve and the intermittent nature of renewables.

MR. OLSON: Not so far out of the realm. We're interested in that same topic.

MR. SCHORSKE: In the innovative area, I'd suggest a strategy around shared e-mobility as a consistent program emphasis. I know that Envoy, which is one of the models, got into the EA funding pot, and maybe others with CEC as well, in Sacramento and elsewhere. I think that's a super interesting model. It's shared vehicles in multi-unit developments and

other places for a roundtrip car share model.

And, you know, vis-a-vis the overall Governor's goal or State goal, now, on the 2025, I think an e-miles goal, vehicle e-VMT goal would be relevant to help really target funding for those vehicles that are super high mileage and that carry passengers. Whether they're, you know, transportation network company vehicles, transit, or a school bus, there's a vast difference in funding a charging station for a vehicle that's carrying folks and/or, you know, has 20,000 miles a year versus a lot of light-duty vehicles that are getting deployed, particularly in public fleets that have, you know, single-digit thousands of miles, which is a terrible waste.

So, I think, you know, for both HVIP and CEC to be really cognizant of the amount of electric vehicle miles enabled by a particular vehicle application could be super helpful.

And then, something that really is more of a strategic approach to shared e-mobility, particularly for disadvantaged and lower income communities. Thanks.

MR. OLSON: Very good, appreciate that.

Okay, so, Larry, the panel is open for public questions/comments, if anybody has any, or any requests for clarifications.

MR. RILLERA: Thank you, Tim and panelists, appreciate your time this morning.

We will open up the public comments. We will first start in the room. Very brief comments, if you will, trying to wrap up before 12:00 or so.

And then, we will go to WebEx for some comments as well.

When you come to the dais, if you wouldn't mind stating your name and your affiliation, and then go ahead and providing your comments. Thank you.

In the room, if there's anything?

MR. CHANGUS: Jonathan Changus, with the Center for Sustainable Energy. And I can pretend to apologize for taking a second bite of the apple, since Andy's done a phenomenal job already.

But an area of emphasis I just wanted to kind of put in there as well, as Andy touched on it, when we think about replicability, I think it's really important that as we have these statewide programs we understand there's not a single solution at the community level, at the regional level. And that's one of the strengths, today, of CALeVIP is the ability to kind of tailor on a regional basis.

And that extends, then, into he mentioned our increasing reliance and partnership with community-based

organizations and community partners. Because it feels like historically a lot of, you know, marketing and education outreaches one direction we're going, and then we're trying to tell somebody something. Which is an important part when we're thinking about awareness. But it's equally important to make sure that we're listening. And especially if we're talking about SB 350 and the barriers particularly faced by low and moderate income, particularly faced by disadvantaged communities. In order to help solve the problems, we need to better understand.

And that's where the community partners and having more of a local focus can be incredibly helpful. Such that Redwood Energy's charging needs and solutions are not going to be the same as San Francisco, which may not be the same as Fresno.

And so, it's understanding we want many options. There's a lot of flavors. Making sure that we're open to and adaptable to solving those particular challenges at the local level, in advance of the larger statewide goal.

So, just wanted to put that comment on the record. And appreciate giving CSE a second chance to make those comments. Thanks.

MR. RILLERA: Very good. Thank you, Jonathan.

I want to also thank you, appreciate your work over time with NCPA and raising the same thing with, in that case, publicly owned utilities that some large, a lot of small ones, different viewpoints. And you were very helpful in kind of increasing our awareness of that.

Yeah, next speaker.

MS. TOMIC: Good morning -- good afternoon, Jasna Tomic with CALSTART. So, I will have a chance to speak in the later panel, but I just wanted to emphasize two things that I maybe didn't hear enough today.

The first one is with the large deployments of medium- and heavy-duty trucks and buses happening in the State right now, I think we need a really serious, sizeable block grant kind of program to support medium- and heavy-duty electrification. And that would take a span of sort of technical assistance, as well as incentives for the infrastructure as well.

Because we're finding that fleets are really having challenges, you know, to understand how to deploy, what to deploy, and they need that sort of support, as well as looking at microgrid options that may support some of these larger deployments.

The second thing would be deployment of EV DC fast charging mobility banks that would serve. And I think one of the panelists touched on this a little bit.

That would serve TNCs, as well as micro and mini transit, as sort of the last and first mile, or on demand transit, right. So, these kinds of fleets or these kinds of vehicles right now cannot deploy EVs as much because they don't have enough places to charge at a faster rate.

And, finally, I would urge everybody to think about as the levels of charging, the power levels of charging for light-duty vehicles are coming up to the levels close to the medium, if not the heavy-duty, so we're looking at 350, and 150, 350 kilowatts for the light-duty. That some of the locations that we are placing charging in public type of charging for light duty, may equally serve the needs of the medium- and heavy-duty vehicles. So, we don't have to keep looking at separately, but then maybe combining this. Thank you

MR. RILLERA: Great. Thank you, Jasna, I appreciate your comments. And just a foreshadow, the second panel Jasna will be participating as a panelist. And we will get into the medium- and heavy-duty ZEV vehicle technology investments that the Clean Transportation Program has invested in.

Go ahead, please, next.

STEVEN BROOKS: Hello, my name is Steven Brooks. I'm with Iwatani Corporation. I'd first like to start

by thanking the CEC for these kinds of events, workshops and dialogue. We greatly appreciate it, it's very valuable to us.

As some of you may know, we acquired four stations, hydrogen stations earlier this year, previously built by Linde. We'd also like to thank the CEC for all the support you have for these stations, historically. It's definitely been very, very helpful.

We'd also like to ask, you know, as we're moving forward, we're considering increasing capacity at these stations. Namely, like Shane discussed, we're having an issue meeting demand and it's become an issue in terms of operability and really meeting customer needs. And we'd like to express a need to the CEC to really consider these kind of capacity upgrades moving forward to really build out the network. Especially, meet capacity, especially as new vehicles come on the road.

So, thank you, I appreciate it.

MR. OLSON: So, just a comment, Steven, that you're referring to existing stations, meaning our money could be eligible for upgrade -- capacity upgrades at existing stations? Is that what --

MR. BROOKS: Correct. And I do know in the draft solicitation concept there is a language in there, as it states now, that there is options for upgrades and

capacity. I just think that as these more vehicles get deployed on the road, and in light of recent events where we've seen increased -- you know, increased demand and increased through put that it's a real issue moving forward as these cars get deployed. And it should be considered as something as important, independent of new infrastructure development.

MR. OLSON: Very good, appreciate it. Thanks.

MR. BROOKS: Thank you.

MR. RILLERA: Great, thank you.

Go ahead, please.

MR. WALLACH: Well, I think it's still morning. Steve Wallach here on behalf of the Center for Transportation and the Environment.

I think I want to kind of reiterate some of the comments that you head earlier, regarding like the fleet transitions, particularly for like public transit and the need for infrastructure funding.

You know, as they scale up and go just from 5 or 10 vehicles to hundreds of vehicles, the real obstacle is the infrastructure. And particularly for hydrogen fuel cell buses, the cost of that initial infrastructure has kind of limited the adoption. But also, that cost, that hurdle, you know, impacts the price of hydrogen. It doesn't lower it. But it also impacts the price of

the vehicles because those production numbers aren't there to further the supply chains, to reduce the price. So, we do -- we will follow up with written comments. We'd urge you to maybe include that in future programs.

MR. OLSON: Very good. And that's just a -- Shane, do you have a comment there?

MR. STEPHENS: Well, I was just encouraged to have a discussion on infrastructure. I mean, we frankly haven't heard from a lot of, you know, fleets. But I think there's a real opportunity to build, you know, infrastructure that can -- I don't know if it can be cost competitive, but certainly get into the realm of cost competitiveness for fleets.

MR. RILLERA: Go ahead, next speaker.

MR. RUIZ: Good morning -- good afternoon. Thank you for the opportunity to have this exchange. My name is Antonio Ruiz and I'm with Nikola Motor. Nikola Motor is a fuel cell electric vehicle, electric trucks manufacturing company that is also bringing infrastructure.

I just wanted to echo some of the comments that I heard from our colleagues that there is need for high capacity fueling infrastructure.

There's also, for the Nikola business model, we have onsite production. And for that, we're looking at

electrolyzing, grabbing hydrogen through electrolysis. That means that the cost of energy, the cost of electricity, specifically, is an issue.

So, California tends to be challenged in competing with other states in terms of cost of electricity. That's an area that we would like you to consider more.

For us to be competitive, and we need to be competitive, I think we want to look at cost of electricity coming down to the few cents per kilowatt hour. So, wherever there's a renewable energy spill and so forth, it's great to look at it as opportunities.

Also, keep in mind that these stations, although they're for heavy-duty deployment, they will also cover light-duty vehicles because there's also a need for that and we want to promulgate some of that as well. Thank you.

MR. RILLERA: Great. Thank you, appreciate those comments.

MR. OLSON: Yeah, go ahead, Shane.

MR. STEPHENS: Just thank you. It's a fantastic comment. And I think, you know, when I was talking about interagency kind of coordination, maybe it's not quite the place of the CEC, but the extent that you can help, you know, deal with the right markets and pricing

for things like spillover. I think, you know, electrolysis is probably closer than we all think, if we could just get the electricity markets to work well to actually capture what would otherwise be curtailed renewable electricity. So.

MR. OLSON: Yeah, and on that line, we're interested in your comment, your insight, your support for some of these either technology demonstration, or deployment, including things like power to gas. We're very interested in that. We need some feedback on whether that should be a target area.

MR. RILLERA: All right, Hannah.

MR. OLSON: Yeah, go ahead.

MS. GOLDSMITH: Hi, Hannah Goldsmith with the California Electric Transportation Coalition. And for those who don't know, CalETC is a nonprofit industry association made up of utilities, automakers, charging station providers, and others that are supportive of transportation electrification.

And I also want to thank the CEC for putting this on today. And agree with a lot of the statements that have been made, this funding is absolutely critical, as we've heard how important these projects are.

And I just wanted to speak to a couple of things

regarding VGI and V2G. We also are very interested in that and are particularly excited to see the PUC process start this summer to determine and dig into the value, which was discussed today. The utilities, and automakers, and charging station providers are very interested in that, too, particularly that value side.

And then, also to Ryan's point about building codes, that was only slightly discussed today, but that's something that we're very actively engaged with. And the Building Standards Commission, and the California Air Resources Board, and I anticipate the Energy Commission will be involved in this as well, but they'll all be looking at increasing the stringency of the nonresidential code for new construction this cycle, which is occurring right now.

And one of the things that they're also considering doing is adding requirements for alterations and additions, or particular changes to existing construction on that nonresidential side. So, that could be really important to getting more infrastructure in to support the future installation of charging stations. Thank you.

MR. RILLERA: Thank you, Hannah.

MR. GOLDSTEIN: Hi, my name's Brian Goldstein. I'm Executive Director of Energy Independence Now.

We're the only environmental nonprofit that just focuses on fuel cell electric vehicles and renewable hydrogen infrastructure.

We had heavy participation in drafting the initial Hydrogen Highway initiative and have worked closely with the CEC for many years on this topic.

So, I'd like to commend the actions of the CEC and specifically in remaining technology neutral, which I think has really helped to provide a level playing ground for a couple of different types of technology, PEV and fuel cell electric technology, which don't necessarily progress at the same speed because it's clearly much more challenging to install a communal hydrogen refueling infrastructure than it is, you know, initial charging stations.

But I want to reiterate that. We only have two tools in the ZEV toolbox, right, so it's fuel cell electric vehicles and battery electric vehicles for complete zero emissions. And so, I'm very happy to see that the stance that the Energy Commission has taken over the years in order to, you know, hydrogen fueling and fuel cell electric vehicles an opportunity for the market to develop here in California.

So, in California right now, we have more fuel cell electric vehicles than any other place in the

world. However, we are behind, actually, in fueling stations and renewable hydrogen production. We're behind several other markets.

So, one thing that our organization does is conduct research and analysis on topics like this. And our upcoming bit of research is essentially a financial analysis, an investor's guide to hydrogen.

So, initially, we took kind of a poll among member companies from different organizations, like the California Fuel Cell Partnership, the Hydrogen Business Council, and the Hydrogen Council which is a global organization. And the Hydrogen Council, specifically, has about 60 different members representing trillions of dollars in market cap and I believe 4 million jobs for the 60 member companies of this organization.

So, the poll that we took was what type of investment were they looking to put into California? And we made an initial list of ten different companies that have expressed interest. Some that you've heard from here today, and some that you all are probably very familiar with.

So, the first three companies that we went out to speak with, and we asked specifically, you know, what's your investment outlook? How much money are you looking to put into this space in California, in the

next two to five years. We're going to go through ten companies. The first three totaled $1.2 billion that they're looking to invest in the California market right away. We stopped at that point because we knew this is a -- you know, this is a huge investment opportunity to attract investment in this space from other companies from around the world.

It's the work that the CEC has done to help create this market, to open up the market and to attract these investors. That is about to facilitate a huge level of infrastructure investment in California.

So, we'll submit some written comments about the specific areas of infrastructure investment we think will help unlock some of these investment dollars. But I want to let you know that the CEC isn't alone in the investments that you're making here. I think Shane alluded to this earlier. It really is, you know, a gathering storm, so to speak, of support for the fuel cell industry here in California.

So, thank you for the work you've done in this area and we're really looking forward to seeing it mature in the coming years.

MR. RILLERA: Thank you, Brian. And to the extent you're willing to have that surveyed result placed in our docket, we're interested in that, too.

MR. GOLDSTEIN: Okay, all right.

MR. RILLERA: Or summarized somehow, that --

MR. GOLDSTEIN: We'll certainly put a summary together for you.

MR. RILLERA: All right, thank you, Brian.

Any more comments from folks in the room?

MR. ELRICK: Tim and group. Thank you for the opportunity today. I think this was a very valuable and interesting discussion. I want to focus just a few comments that I believe high level will reflect and reinforce some of the --

MR. OLSON: Excuse me, Bill, could you introduce yourself, please?

MR. ELRICK: Oh, thank you. Bill Elrick, California Fuel Cell Partnership. My comments, really, I think will reflect and reinforce some of what we've heard already on both technologies.

The first is aligning the State's activities and goals. You know, the slides 9 and 10, I see here on the screen, bullet number 7, and even some of Tim's comments, it's very important and good that we're referencing the State's long-term goals, and specifically mentioning the 5 million ZEVs. It gives directions to staff. It aligns the activities with those goals, and it sends a clear signal to the industry

side of this on where we want to be.

That's on the page pretty clearly, and here it's also reflected that hydrogen isn't reflected with the same, long-term references towards these 5 million ZEVs. I think that's an important piece.

Looking at how we're trying to do this, another thing on slide 10, I saw that it illustrates our market's approach to analyzing the current networks directly, aligning the vehicle deployments and the capacity served to the spending, the self-sustaining market potential, and government's exit strategy. So, all of this is very important for us to align all of our ZEV, and really any money the State spends towards an end goal of success.

The second comment I have is around the recommended funding objectives you mentioned. I have two comments here. The first is that all the State's money and actions asks for long-term, self-sustainability projections for the awardees. Again, what are we trying to achieve and how are we going to get there? Because if we're not actively addressing and working towards an exit strategy for subsidies, we're not actually actively working towards that.

So, you know, I'd like to start by formally submitting this, our market self-sustainability vision

for 2030, and encouraged to see more of that across the board.

And then, the second recommended funding objective is to continue, as you've done, to provide the long-term, durable policy framework for everyone to follow. This gives the appropriate signals both to staff, and to industry. And for industry, we just talked about it gives confidence in unleashing and unlocking that private investment that we need for market success and, again, government removal of subsidies, which should be our end goal.

And then, the last comment I will make is on grid integration and the larger renewable energy transition. Simply put, we need to encourage and incentivize the integration of hydrogen electricity, the two energy carriers that enable zero emissions, and we need to not penalize them.

And I think CEC's role is especially important here because of all the different programs and activities that line all these up and start in encouraging and engaging across all the different activities for this kind of discussion.

You know, this will not only expand and quicken the renewable hydrogen network development that we're looking for, for light- and heavy-duty vehicles, it has

the added benefits of a more reliable grid. It will deepen the renewable penetration capabilities, and it will open up new and difficult markets through the renewables, such as industrial and manufacturing.

So, again, CEC's role in this is really more critical than -- or probably are one of the leading agencies throughout the State on this.

So, with that, I'll thank you for the opportunity and look forward to more interesting discussions to come.

MR. OLSON: Bill, just one question. Is your -- is this also referred to as your roadmap, or is that a different -- is your roadmap ready to be publicly included in, say, a public docket?

MR. ELRICK: Absolutely. And I'll say, we refer the roadmap to the first really seminal document we produced, which was 2012, which was how do we start the market? Looking at that first 100 stations target and getting things moving.

This, we call the vision document. And that's definitely, formally there. And it is answering the question of what a successful market looks like that gives value to the State, and the environmental benefits that we're seeking, the subsidy withdrawal that I think we're all looking for. Profit, so we can have private

investment on the industry side. And, most importantly, ZEV technology at a cost competitive rate for the consumers, which is how we're going to drive adoption and get to those end goals.

MR. RILLERA: Great. Thank you, Bill, appreciate your comments.

We will now shift to comments, brief comments online. Sara Rafalson.

MS. RAFALSON: Yes, hi, this is Sara Rafalson. Can you guys hear me?

MR. RILLERA: Absolutely.

MS. RAFALSON: Okay, great. This Sara Rafalson. I am Market Development Director at EVgo. And just first wanted to echo one of the previous comments and thank the Energy Commission for both the opportunity to provide comment remotely, wish I could be there today, but also for their work on transportation electrification.

I think, in particular, I just wanted to highlight and echo some of the comments from the first panel on CALeVIP, which has been really important for catalyzing investment not only in Level 2 chargers, but in EVgo's case, DC fast chargers.

And, in particular, I wanted to give some kudos to Brian, from the Energy Commission, and Andy from CSE

for their thoughtful approaches to program design.

So, we've got about 1,200 fast chargers across the U.S. Over half in California. And a lot of that is thanks to strong public policy here in California, and programs like those with the Energy Commission.

In the past quarter, alone, we installed about 100 DCFCs, and we'll have about 150 more deployed by the end of the summer.

And like many of the earlier panelists, too, we also participated in the CEC Corridor Program. But I agree with John that I think a model more like CALeVIP really helps increase velocity. And we look forward to future participation in CALeVIP in subsequent years.

Just one of the challenges that I wanted to highlight, and I agree with a lot of the challenges that were brought up earlier on just infrastructure deployments. But one, in particular on CALeVIP, and Andy actually highlighted this, is that funding more or less closes shortly after opening. And then, it takes some time for projects that might fall out, due to permitting, which was mentioned earlier, or other things to kind of fall out of the queue as they're given time to meet certain development milestones.

And, I mean, this is a very familiar challenge. Many of the early generation energy programs have

experienced similar program design challenges. And I just think on this one hand this is really great demand. That's the program more or less as we go 48 hours.

But on the other hand, I just think it would be good, from a program design perspective at why that it is. And as there's more data on project attrition, I think it will be important to look at that.

Last, and I know it's been top of mind for other panelists, as well, we agree that cracking the code on the multi-unit dwelling segment is really challenging. But I do want to acknowledge that Level 2 at apartments is certainly one solution. But also wanted to acknowledge the role of public charging, and serving the segment of MUD residents, and EV drivers, including myself, who can't access some charging.

And I think last, other than that, just wanted to again congratulate Brian, Andy and the team for the good success of CALeVIP and just express our appreciation of their work. But also, endorse a bigger statewide CALeVIP program. And we look forward to engaging with the Energy Commission on future stakeholder discussions and workshops on program design to ensure more rapid buildout of chargers. So, thanks.

MR. RILLERA: Great. Thank you, Sara, appreciate your comments.

Our next commenter online is Wayne Leighty.

MR. LEIGHTY: Yes, hello. Can you hear me?

MR. RILLERA: Yes, please.

MR. LEIGHTY: Hi, I'm Wayne Leighty. I'm a Business Development Manager with Shell Hydrogen. Also, a decade ago at UC Davis, my graduate studies was on the transition paths we're talking about, now.

I would offer to add to this good forum, the observation that we're now 30 years since the California ZEV Mandate was established, which means we have 30 years remaining to achieve 2050 emission reduction goals.

I think the first 30 years have established a very strong foundation of readiness. Technology becoming products, becoming industry, and investment readiness, and policy frameworks become programs that have established momentum.

It seems, then, that our challenge is to accelerate and scale. I think there's very good news there. There are virtuous cycles in cost reduction, in unlocking more compelling customer value propositions.

On the hydrogen side, for example, it gets easier and it gets lower cost as we get larger. So, that's the good news.

We have been working, I would echo some of

Shane's good comments, in a very collaborative, productive way on the pivots in policy that helped unlock that next step in acceleration and scale.

The capacity credits, as they're called, the hydrogen refueling infrastructure, and also for DC fast charging, and the Low Carbon Fuel Standard that was adopted by the Air Resources Board rulemaking last year, and in the solicitation concept from the Energy Commission to tweak the funding opportunity on hydrogen into a multi-year, and network-based kind of program are examples.

I think our focus really should remain, also, on the customer side, early majority and mass market adoption, whether we're talking individuals or fleet owners. It's about this value proposition that continues to be enhanced. Things came up that were very good today. Workplace charging. You know, hydrogen refueling, et. cetera And I thin some elements of exhilaration and scale.

I would just close by giving some encouragement that at Shell we are developing the full range of new fuels, renewable natural gas, or CNG vehicles, renewable diesels and other biofuels, charging. And then, my role within this company is hydrogen.

So, echoing some of Shane and Brian's comments,

in hydrogen in particular, Moore's Law is a powerful thing. We see the hydrogen station cost being reduced in half and capacity being doubled every two to three years. That means that gasoline parity is possible and in our sites. It means we're already cost competitive with a fast charge, a 60 kilowatt or higher kind of fast charge, while the hydrogen station is about 3,000 or more kilowatts.

And at this moment when production capacity is being demanded, it's tipped toward renewable and load to negative carbon intensity.

So, here's a new energy industry for California that's just getting started, that gets to start from scratch, and gets to start done right in the sense of low and negative carbon intensity.

So, I would say bravo to the success to date. Importance to continue it, to sustain the momentum and emerging demand that's been established. And the key is pivoting to scale. That's an amazing thing in that the major infrastructure initiative is starting, leveraging millions, hundreds of millions, perhaps, of public funds for billions, tens of billions of investments. It means that fundamentally California's somewhat challenging cost environment is also a key focus. Thank you very much.

MR. RILLERA: Great. Thank you for your comments, Wayne.

We will now go to Stephen Ellis. Stephen Ellis and you will be our last commenter.

MR. ELLIS: Okay, great. Hi, this is Steve Ellis with American Honda Motor Company. And glad to be able to offer some supporting comments and certainly support the comments earlier by Ryan Harty. Certainly, Shane and now, of course, Wayne and others toward, you know, both plug-in and hydrogen refueling infrastructure.

After all, I think, you know, we hear very often now transportation's representing 50 percent of the CO2 emissions, carbon emissions toward climate change. And of that, clearly, there are two light-duty solutions available for the public.

And now, you know, that Honda has had the Clarity out into the market in three different power trains, plug-in electric -- I'm sorry, the plug-in hybrid, the battery electric, and hydrogen fuel cell. We hear very often from the customers appreciation for the ability to have choice. Choice toward driving near zero to zero emission vehicles that meet their needs. And hence, that's the focus of my comments here.

Certainly, want to encourage CEC to continue

working with industry and within State government, especially, to remove hurdles and barriers within the State. For example, with AB 8 funding limits for the annual hydrogen station funding. After all, you have heard from others that we are behind in the number of stations that can support the vehicles on the road.

Certainly, one of my roles at Honda is, you know, stay in touch and interact with our customers. And speaking on behalf of those taxpayer customers driving the Clarity fuel Cell, that they are certainly puzzled why the station growth is as slow as it is. And so, we know that some of these limitations with the funding are a part of that.

So, while we're very grateful and appreciate the work of CEC and, of course, funding, helping to support funding for the stations, we'd like to see that accelerate even more.

Winding up here a little bit, you know, just as there's been discussions about time-of-use rates, you know, for plug-in charging infrastructure, I'd ask that you also work closely with PUC and please accelerate and implement, you know, similar rate strategies for the hydrogen stations electric loads that they will utilize.

Because we do, as Wayne said so well, want to see a continuation of cost reduction for the hydrogen

available for the vehicles. Customers expect that. And the electric loads can be a part of that.

So, I think as you've talked about parity, there should be parity because both of these uses of the electrons work to enable more zero emission vehicles into the market and help the State to achieve its carbon and CO2 reduction goals.

So, again, I just want to thank you for the continuation of your good work and learnings along the way that you keep applying. Shane mentioned earlier about the importance of listening to industry. And certainly, I know I've been one of those voices. And appreciate those things that you implement when we do speak.

And last, just for hosting this workshop and providing additional opportunity to hear the voice of industry and other supporters. So, thank you.

MR. RILLERA: Great. Thank you, Steve. I appreciate your comments and your representation of American Honda.

We are going to break for lunch right now. I want to thank Tim Olson for moderating the panel, and the panelists for your participation this morning. Thank you.

(Applause)

MR. RILLERA: Whoops, one more thing. I know we have identified here 1 p.m. I think we'll go to 1:45 -- excuse me, we will reconvene at 1:15. Thank you.

(Off the record at 12:26 p.m.)

(On the record at 1:20 p.m.)

MR. RILLERA: All right, welcome back everybody. We will now have the Panel 2 of the staff workshop for the Clean Transportation Benefits Report and Successes for the 2019 IEPR.

At the table we have Kent Leacock of Proterra, Morgan Caswell from the Port of Long Beach, Jannet Malig from Cerritos Community College District, and Jasna Tomic from CALSTART. Ben DeAlba will be moderating this panel.

On the screen, you have the list of representative projects for the workshop that we will be discussing today. And I will tee up questions, questions that the moderator will ask of our panelists.

Okay, then, go ahead.

MR. DEALBA: All right, thank you, Larry. And welcome to the panelists. We really appreciate you all coming a long distance, some of you, to be here today to talk about zero emission technology, vehicle technology. Particularly, we're going to focus on medium- and heavy-duty vehicles, specifically.

I just want to preface by sort of giving some weight to the importance of this conversation. We have a new Commissioner here, at the Energy Commission, Patricia Monahan, who is very interested in how to advance the medium- and heavy-duty sector. I think that she understands about the opportunity that's there.

And so, I want to just put that out here because whatever we hear today is certainly going to be taken note of and inform a lot of the programs that we do here at the Energy Commission. So, again, we thank you so much for all of you being here today.

With that, I'm going to allow each panelist a five-minute introduction. Introduce yourselves, your organization, and your role in the zero-emission medium- and heavy-duty sector.

And then, as Larry pointed out, we'll go through of each of the questions that we have up on the slides, and have a bit of conversation and dialogue about them, as all of you have got rich knowledge in the medium- and heavy-duty sector, whether it's manufacturing, actual deployment, or an operator, or in workforce training. So, I think we're going to have a very rich conversation here, so thank you.

So, I'm going to start. Well, after we do the comments, then I'll have everybody do closing remarks

and we'll hold public comment until later in the workshop.

So, we'll go, just start to my left. Kent, you want to take it away.

MR. LEACOCK: Okay. I don't want to do too much background because of the introduction, because of it leads to some of your questions up there.

But name's Kent Leacock. I'm the Senior Director of Government Relations and Public Policy for Proterra, the leading electric bus manufacturer and the leading U.S. bus manufacturer.

And Proterra is located, our corporate headquarters are in Burlingame, California where we manufacture battery packs, and we have our R&D center. We also have a factory in Southern California, in the City of Industry, where we manufacture buses, as well as our original factory in Southern California -- I mean, in South Carolina, in Greenville, South Carolina, where we manufacture buses.

As I mentioned, I'm in charge of government relations and public policy. And what that entails is I spend a lot of time advocating on behalf of transportation electrification policies from the perspective of funding, as well as policies with utility commissions across the U.S., and utilities. Advocating

to have utility commissions around utilities to build our infrastructure on behalf of transits, and other heavy-duty fleets. For example, port opportunities, et cetera. With the unique twist that, on the transit side, because transit agencies are nonprofits and they generally operate at a loss, and they're in existence because of federal, state and local funding that they should get the ability to have the infrastructures rolled out by the utilities, and rate-based on their behalf.

As well as, what some of these utilities like to call a business development rate should be offered to the transit agencies as they transition over to electrification, to allow them time to secure data, and kind of rate monthly rates, and understand their bill. Because, you know, previously it was a pretty straight forward thing with them. But now, with electrification, they need to move into a completely different class of customer. And there's a lot that they don't understand about the rate process. You know, they never knew what demand charges were until they started charging electric buses at high rates.

And there's a lot of other aspects of electricity that they didn't understand, that many of them do now. And, in fact, you know, it's interesting

how far ahead California is.

And so, you know, as I said, one of the other things I do is I travel around the country speaking at utility commissions, and attending NARUC, National Association of Regulatory Utility Commissioners, to try to get them to pay attention to the heavy-duty sector.

The passenger vehicle market, you know, the Teslas of the world, the Nissan Leafs, and BMW I3s and I8s, that's all the sexy aspect of transportation electrification in passenger vehicles.

But, you know, what we're trying to get them to understand and pay attention to is that the heavy-duty sector, fleets, goods movement at ports, et cetera, has the ability to have a much greater impact on diesel particulate matter, greenhouse gases, and it is a much more stable, predictable, and knowable load because those vehicles will have to charge at the same time day after day, week after week, year after year. And it's guaranteed because they have to run every day.

Unlike the passenger vehicle market where, you know, they may or may not charge at work, they may charge in the middle of the day, they may not need to charge a particular night. These fleet vehicles run every day. They're the highest kind of polluters and so conversion to them in the electricity sector, into

electricity is going to be the most beneficial bang for your buck in terms of, you know, the population that lives around there, the population as a whole, and towards grid stability as well.

MR. DEALBA: Great. Thank you so much, Kent.

We're going to move on to Jasna, of CALSTART.

MS. TOMIC: Sure. Good afternoon. So, my name is Jasna Tomic. I'm Vice President at CALSTART. And CALSTART is a nonprofit organization that has been around for 27 years, focusing specifically on advanced transportation technologies and solutions.

And we work across four different sectors, cars, buses, trucks, trucks and off-road equipment, and fuels. But I will say our biggest line of work, the majority, about 80 percent of our work right now and in the recent years, has been in bus and truck, and off-road equipment. It's where our strongest programs at the moment are.

And that is sort of reflective of what Kent was nicely mentioning, you know, the need of fleets, and to decarbonize and to drop their carbon footprint overall.

So, over the years we've done a number of projects that start -- again, specifically in medium- and heavy-duty. We work across from technology development, you know, just early demo type of projects,

to bigger pilot projects, and then extending them into the precommercial and commercial markets. So, that's kind of the space where we work the most and the best, really, and putting private/public partnerships together to accelerate that market across the board.

Some of the entities we've been working with include all the large fleets across the State, UPS, FedEx, Pepsi, Coke. And then, from the manufacturer side, again we work with all of a variety of the heavy-duty, medium- and heavy-duty supplier base on both buses and trucks.

So, this is just -- I'd just like to emphasize Kent's comments on this, as we're all focused sort of on looking, and how do we decarbonize and how do we drop the carbon footprint from transportation. The dual thing that makes this medium- heavy-duty sector really attractive is, one, it serves all. Everybody benefits from it because all communities equally benefit from cleaner trucks and cleaner buses in their communities. So, it's much easier through that sector to address sort of the disadvantaged communities issue that we all try to make sure are included.

And second, per, yeah, per bus and per unit they're definitely a larger emitter. And I guess, third, you've got fleets that you work with, so you can

actually come down to a reasonable calculation of a total cost of ownership, and make sense of it so that it can get implemented in a faster and more efficient way.

And I'll be happy to speak along, as we go through the other questions, you know, what are some of the successes that have happened over the years. We are very grateful to the many projects that we have had funded from the California Energy Commission, and that has been in this space of medium- heavy-duty, but outside of that, as well infrastructure. And then I think I'll just wait to hold off on my other comments regarding kind of the next steps. Thank you.

MR. DEALBA: Great, thank you so much.

We'll move on to Jannet, Cerritos Community College District.

MS. MALIG: Good afternoon. I'm Jannet Malig from Cerritos Community College District. I'm am actually the -- the official title is the Statewide Director for the Community Colleges System.

Our main focus is workforce development. It is specific in the area of clean energy, clean transportation. We're now called advanced transportation and logistics.

Our main focus is to really look at the opportunities of what is the workforce demands and the

skills gaps that are needed today, and what it will look like in the future.

And, you know, we've been very lucky, again, through funds that we've gotten from the CEC to really work with medium- heavy-duty and, actually, work all the way down to the high school and build a pipeline. So, we've been able to train and convert workers on the technology, so they feel much more comfortable.

And we're then able to work with the community colleges, because we have 115 community colleges in the State of California. So, that means we have a great opportunity to meet the demands and have everyone at a much younger age, at like high school level, as part of one of the grants that we have here, to be familiar with electric vehicles, or in their eyes, or the way that they see it and be very proactive in looking for it, and want it in their own communities.

And we've especially seen it in a lot of disadvantaged communities where the air quality isn't good. They're eager to do it. And the job market, and the job opportunities, and the skill sets are being able to meet those demands.

So, by working with, you know, transits, fleets, municipal fleets, we're able to identify immediately what are those skills gaps and be able to develop

curriculum and train them immediately with that. So, we've been very lucky from workforce development, for incumbent worker, working with community colleges to design and develop curriculum. And then, be able to build a future workforce at the high school level.

So, you know, thank you for that, for us.

MR. DEALBA: You're welcome. We're happy to have you as a partner.

And next, we'll go to Morgan, of the Port of Long Beach.

MS. CASWELL: Hi, I'm Morgan Caswell. I'm an Environmental Specialist at the Port of Long Beach. I'm specifically on our Air Quality Team.

So, I'm responsible for the implementation of the Clean Air Action Plan, along with my other air quality teammates. Specifically, I focus on grant demonstration projects at the port. I manage grant demonstration projects at the Port, including one that was funded under the Clean Transportation Program. I also focus on vessel emissions. We have various strategies for all of our sources of emissions at the Port. And then, I work on other air quality programs that we have.

I want to give you a little bit of background about the Port of Long Beach because I think, as the

Port, we have to do a lot of educating on what our impact is, how we operate. So, we, between the Port of L.A. and the Port of Long Beach, bring in 40 percent of the nation's goods. So, we have a significant footprint. And our sources of emissions include terminal equipment, trucks, locomotives, harbor craft, and the vessels.

Today, we'll talk mostly about trucks and the terminal equipment. But I just want to recognize that we know that we have a significant impact on our local community and their health. Folks who live close to the ports have greater risk of cancer. They have greater risk of asthma, respiratory disease, cardiopulmonary disease. And we are actively working towards reducing that risk and eliminating the contribution that comes from the ports.

So, the way that we're doing that was really started in 2006. Between the two ports, the Port of L.A. and the Port of Long Beach, we came together, and we developed the Clean Air Action Plan. And this is a plan that outlines our strategies to reduce emissions from port operations.

We've since then had two updates. And in our latest update, the ports declared new goals for us, which include zero emissions terminal equipment by 2030,

zero emissions trucks by 2035, those that are registered in the ports' drayage truck registry. And we have green house gas goals, now, which include reduction of 1990 level greenhouse gases to 40 percent below 1990 levels by 2030, and 80 percent 1990 levels by 2050.

So, I do want to highlight that, you know, the CEC has played a major role in advancing technology down at the ports. And I'm really glad to be here to talk about that today. I think what's unique about this program is that it really goes after different aspects of this transition to zero emissions, whether it be workforce, or the planning process that goes into, you know, cost effectively deploying new equipment, and then actually demonstrating the equipment so that it can advance to a place where it's equivalent to diesel while in there.

MR. DEALBA: Very good. Thank you very much.

Okay, so, we'll move into the question phase of the panel. And I think the first question I want to start with Jasna. And it reads: How have your Energy Commission projects moved the needle for ZEV markets. And I want to start with you, Jasna, because CALSTART has been an instrumental player in, one, helping with the beachhead pathways theory, and philosophy, and working with other State agencies. So, you've got a

very universal knowledge of seeing all these projects unfold. So, I'm going to look to you to help set the stage and maybe just touch on number one, as well. And then, feel free, we can all chime in.

MS. TOMIC: Great, great, thank you. Thank you. When we were discussing the panel, I was glad to see you use the term beach way pathways. And I'll speak to it a little bit. So, beach way pathways addresses -- basically, it's a term, I think, used in the military. It's the first beachhead markets or in the market acceleration business as well, that you want to launch your product or that you want to sort of get out, first, right.

So, when we look at the whole sector of medium-heavy-duty, not all vehicles are equal in terms of timing, getting to the market. Buses are definitely ones that are earlier and sort of ahead of the game, but they lead the pack and set the stage for the other vehicles that come along.

That next in line would be the medium-duty or delivery vehicles. So, we've segmented them according to the different applications, right. Transit buses, medium-duty delivery vehicles, then larger, regional delivery vehicles, et cetera, as we go along that to come to the over-the-road trucks, which are sort of the

big emitters, but maybe a little bit harder to electrify at this very moment.

So, going specifically back to your question of how did some of this California Energy Commission funding help promote these, I will come back to a very interesting and important program that we had funded from the California Energy Commission on clean trucks. And then include, I think it was a total of nine projects. It was an envelope with nine projects. It included Proterra bus, the first one in Stockton that was -- back then, remember?

MR. LEACOCK: Yeah.

MS. TOMIC: Yeah. So, that was one. It included a Volvo plug-in truck. It included the Odyne plug-in utility truck, Motiv electric vehicle, TransPower, Artisan. I think I have them, most of them.

MR. DEALBA: I've got them here, so Caterpillar.

MS. TOMIC: Caterpillar. A Caterpillar excavator and Volvo wheel loader.

MR. DEALBA: Exactly.

MS. TOMIC: Right. So, a mixture of buses, trucks, and medium-duty, and those were all pretty much first of their kind, right. Developed with the help of this funding and first, it was one-two in each case, at the most. The first of their kind to sort of

demonstrate the technology with the fleet in use. And that was super important, very important to get that going. That was an example of public/private partnership.

Those projects definitely set the scene, I will say, for future things and future projects that came after that. I will just speak to the Proterra example, I'd say, with Stockton. And then we followed up with some FTA funding later, and they had seven buses. They had more than seven, maybe, but seven.

Yeah, so, from that one it expanded to seven. And we completed that project just last year, actually. So, they are now analyzing how do they electrify, you know, their fleet completely. How do they go and satisfy the zero-emission transit rule with -- and this project set the scene for them.

I will name another one, the Caterpillar excavator, which basically became -- it was a hybrid unit. Caterpillar basically made it a production right after.

The Volvo wheel loader, similarly. The plug-in Volvo truck has now -- was, essentially, the predecessor for what is, today, going to be the -- well, soon, going to be the Volvo all-electric truck under the Volvo Lights Project, funding by Azanza (phonetic), from

California Energy -- from California ARB funds.

So, my point is these are instrumental and very important things. And I think the money from the Energy Commission definitely supported sort of the first units coming out, and then it continued support after those.

I have a list of things that we have continued since, definitely in the bus world. I just wanted to, you know, put an overall look on it.

And last, but not least, from these beginning steps of initial funding, I wanted to say that this beachhead market has now developed into a global program, actually, called Drive to Zero Program, which is looking to how to electrify not only California, and not only the regions and cities in California, but basically across the globe, Canada, China, Asia, South America, Europe, and to find the initial markets where we can do similar programs. Electrify buses, electrify trucks, either at the ports, or somewhere, and then grow the market from there. So.

MR. DEALBA: There was a lot of mention of Proterra in that project with the buses. Thank you, Jasna, that was a very good overview and in-depth look at some of your projects.

Now, Proterra, obviously, you're very focused on buses. And, you know, we haven't really touched much

either on the difference of the technologies that we're talking about here, in zero-emission vehicles, but I'll just let you chime in. Do you have any other thoughts on some of the projects that were part of the CALSTART, especially the one that was in Stockton, and seeing some of those maybe unfold into next generations of your buses?

MR. LEACOCK: Yeah. And, in fact, that Stockton project was -- I'll say that was back when we were a South Carolina company that its first two customers were in California, of which Stockton was one and Foothill Transit was the other. That was our -- I'll just say it's our generation 1.5, first, you know, series of battery electric buses that we built. And those buses were built virtually by hand. That was back, I want to say, what was that 2009, 2010, 2011. Maybe we started building it in '09 because it probably took almost a year to build the bus, or a year and change, quite frankly.

So, anyway, what I find interesting is that, you know, we went from back then, a hand-built, you know, kind of science experiment bus, as a South Carolina company, to where we are now. A, I guess, three-time winner of the Energy Commission largesse in terms of funding. Thank you very much.

But it's interesting that the way the progression has happened is that the first time it was literally to kind of hand-build a bus in our factory, in South Carolina. The second time was to establish -- we used our win to establish not one, but two factories. One to build buses at scale and one to complete our R&D, and battery pack manufacturing facility. So, we almost got a twofer on that one. You have a manufacturing facility building battery packs and energy storage systems, as well as some equipment for the R&D center. And then, also, to establishing and building buses for the factory.

And then, this most recent one that's listed is going to allow us to refine and augment our existing factory in Southern California to help scale the manufacturing of buses to meet the demand. You know, we now sell more buses in a quarter than we sold in any three years combined prior to about 2015 or '16. And I'll go into some other detail later about, you know, the scaling of manufacturing and the numbers that we're looking at in comparison to where we were back then, when we were building buses in onesies and twosies, because that's the way people were buying them.

MR. RILLERA: I want to drop this term, which is not identified on this slide here, and I haven't heard

it, so I'm anxious to introduce it, and that is supply chain.

Most of you, either personally, professionally, or within your respective organizations have seen this supply chain in its infancy, in its emergence sort of grow over the years. Could you speak to that? And I'm going to look at Morgan first, and she's seen a lot of companies, technology providers come and go with their technologies, and your partnerships you have with these companies.

And then, similarly, Jannet, if you could speak to that as you've evolved your partnerships there, with Cerritos.

MS. CASWELL: So, just generally, I'll give you a sense of how the ports have grown in terms of container through put, we'll start there. Since 2005, we've actually seen a 12 percent increase in container through put. So, subsequently, we've seen an increase in the equipment at the terminals.

In terms of the way the technology has evolved, you know, when we first started, you know, just kind of talking about zero emissions, we were really focused on near zero. None of the major manufacturers were really at the table and involved in progressing the technology. And it's amazing to see how it's changed. We used to

have, you know, just a handful of technology developers that we were discussing standards with, potential standards. And, you know, today it's just exponentially grown. And we're happy to see that they're coming in to really support this transition, without which we don't think would be possible.

In terms of partnerships that have really had to shape as a result, I would say our partnership with Southern California Edison has changed dramatically. They have been critical in advancing this effort simply because the infrastructure requirements are huge at the ports. You're talking $800 million just for terminal equipment at the Port of Long Beach is what we're anticipating, 155 miles of electrical conduit, you know, 172 transformers. It's significant.

So, they've really stepped up with their Charge Ready Program. They did a pilot. They're working on a pilot with us, which is actually part of one of our CEC programs, to support electrical infrastructure to support 24 battery electric yard tractors.

So, you know, I think a lot of things are moving and people are stepping up to partner with us and to support the transition.

MS. MALIG: Boy, that's a touchy subject for us in the world of education. You know, most educators

think of supply chain management or supply chain in the world of logistics. So, for us in education, it really means what does that mean for the end user and how do we work our way backwards. From the fact that you think that you want your groceries to be delivered in two hours, and what does that mean for what the warehouse is going to look like, and what's the technologies going to be used. And believe it or not, in the world of Amazon, and these short trips, and these drivers, and what does that mean for the ability to take zero emission vehicles and be able fill that. To fill that void and be able to fill that need. And what does it actually mean for us in terms of warehousing and automation.

So, for us, those are kind of the big things for us. It's identifying where are those skill gaps today, and how are we going to be able to meet the need and say that we have a workforce that is ahead of the game. Like, you know, Morgan was talking about, it's what are we going to do with that.

And, so, we're really looking at that today, about where can we be and what do we need to be in being able to affect how that means for transportation and being able to meet those demands. When we think that you place an order today, and you want it within 24 hours, how is that goods movement when it's coming out,

and you think it's coming from the port, and it's going to a third-party warehousing person. And then, within a couple of hours it's in a driver's hand, and then two hours later it's at your house.

So, for us, we have to look at the complete supply chain of what that really means for us and what does that mean for our workforce. So, we are looking at that and looking at specific job skill sets, and what does that mean for workforce for us.

So, we're definitely addressing it already and working with big associations, and trucking companies, and warehousing companies to really look at what does that mean.

And even on the entrepreneurial side what are the opportunities to see and being able to reduce the emissions in the way that they're transporting the goods and services that are out there for us. We're definitely looking at it.

MR. DEALBA: Excellent, thank you. And I'm going to move to number two, otherwise we can spend probably the whole panel on number one. That's a very good question.

And Morgan, I want to start with you on this one. And it reads: Describe new partnerships, emerging opportunities, or lessons learned from your respective

projects. And I want to start with you because the Port, in essence, is just a living partnership you've got. You're a landlord, you're working with terminal operators, you've got countless organizations coming in to pick up goods from your port. And so, you really have got to understand how your partners function, especially when you're demonstrating zero emission vehicle technology.

So, I'll just look to you, to help answer number two.

MS. CASWELL: So, I want to give you an idea of what our different CEC-funded projects are. I think that will help respond to this question. So, we've been fortunate enough to receive nearly $18 million for the CEC for a wide range of opportunities.

One would be the electric vehicle blueprint that the Port has put together and this really is our look at looking at the ecosystem, which is the Port, and all of the related entities on how we move from our current state to zero emissions. It was a significant effort, which included research of current plants and procedures at the port, looks at what we've already done, looks at what everyone else was doing related to zero emissions, terminal equipment and trucks.

And then, we did a lot of stakeholder outreach.

As you mentioned, we have a lot of partners, including the terminal operators, the vessel operators, the utility, a lot of people that we brought together to talk about how we get there. And then, from there, we created a plan. So, that is one project that we have, which was informed by others and continues to inform new projects.

We also received funding for electrical infrastructure to support the build out of charging for 39 zero emissions pieces of terminal equipment, including battery electric yard tractors and battery electric forklifts.

And I know infrastructure isn't the centerpiece of this discussion, but as I mentioned earlier, with $800 million in infrastructure to put in, that was huge for us and easily the largest amount of funding we've seen for electrical infrastructure. So, I do want to highlight it.

And then, third, we have a grant for the deployment and demonstration of nine converted all-electric rubber tire Gantry cranes, as well as 12 battery electric yard tractors. The conversion of LNG trucks to plug-in hybrid electric LNG trucks.

And then, lastly, as part of that grant project, we asked Long Beach City College, which is one of our

local community colleges, to do a workforce gap assessment. So, what that entailed was taking a look at specifically the equipment that was on that grant. It wasn't intended to be a wholesome look at all of the equipment. But looking at the rubber tire Gantry cranes, and the trucks, and the yard tractors. Looking at the projection of how many we anticipate to see into the future and assessing what the workforce will need. What kind of training, what kind of skills they'll need to support that transition. And then, from there, what is already being done at the community college level.

So, in terms of partnerships, I really want to highlight the one with Long Beach City College. I don't think we had ever worked with them in that capacity before. And we continue to go out for funding to support continued work. And we do have another grant through the California Energy Commission that's not part of the Clean Transportation Program, but the EPIC program. And that will actually develop some of that training that we talked about and learned that we needed through that gap analysis.

So, I mean, I think that's a really good demonstration of how these projects are moving the needle to get at question one, but also developing partnerships that we weren't necessarily utilizing to

their full capacity before.

MR. DEALBA: Thank you. Now, that's great and I'm glad you brought up the blueprint, the EV blueprint, because you're getting a lot of positive feedback not only from the Commission, but I believe from some of your partners that we have been hearing on the planning, and not to mention the outreach to the communities, et cetera.

It sounds like you may have another future partner, sitting to your right there --

MS. CASWELL: Right, yes.

MR. DEALBA: -- to work on workforce development opportunities.

Jannet, you obviously need to get feedback from the industry if you're going to be developing workforce training programs. What type of partnerships do you look for to inform those workforce training programs?

MS. MALIG: You know, very similar to what Jasna was talking about. You know, if we had the opportunity to work directly with the manufacturers, or the end users, in many cases for us it tends to be the end user.

Or transits, we -- I belong to an SCRTTC, which is a group of transits. So, we work very closely together in designing and developing the curriculum hand in hand. So, their technicians, their trainers sit with

us to design what that really looks like. And then, we're able to implement it across the State, with our other community colleges.

And it's the same thing when we have a manufacturer that comes around. Most of our community colleges have OEM programs, whether they're light, medium, heavy, or off-road. So, we're able to use the technology that they have to develop and design curriculum, and then we're able to test it directly and, like modify it, and refine it to the point where it actually becomes part of an everyday thing.

And, you know, we talk about how we've been funded multiple ways. We had, gosh I'd probably say it's been like six years, already, when we originally started in a partnership with South Coast and CEC in designing curriculum that we could use in the community colleges. It came out of San Diego, Miramar College.

And we were able to design curriculum. And what came out of that was the ability for the community colleges to take the technology in house and develop curriculum that could be used for it. And then, from that we were able to train incumbent workers, and then put it into actual for credit.

So, you know, we're now at the point of the courses are now for credit. And I think that's been our

partnerships where most of the public sees it, or they don't necessarily know what it means, but then we're able to actually use it in the classroom and go out into the community. And the most recent funding was for high schools to deploy clean transportation technology or education. So, we were able to go directly into high schools and design.

So, it's those kids who walk out of their house, see a bus, recognize what it means, and say, that's what I want my future to look like.

So, I think that's been really important for us. We've been able to take, you know, businesses, education, and the public down to, you know, regular people in their homes be able to do that. So, we've been really excited about that.

MR. RILLERA: Great, thank you.

I'm going to use this workforce question, labor, and look at Kent very clearly with respect to the question as a manufacturer, and your supply of labor, workforce issues, things associated along that line. Thank you.

MR. LEACOCK: We're hiring. No, we have -- actually, we have over a dozen positions in our Southern California facility. And in fact, fortunately, California and L.A. County has an extensive community

college network. And we have a community college right next door to us, Rio Hondo College. Along with another organization down there, called WDACS, the L.A. County Workforce Development and Aging and Community Services.

And what we've found, similar to what Jannet was talking about, basically, we need the workforce of the future. You know, as part of our scaling of manufacturing, we want to be able to bring more things in house. We want to do more with employees from the community, and we want to hire from the community.

And so, we had to start really going outside of our normal path of, you know, we throw jobs up on Linked In, we have employees, reach out to their network, word of mouth. You know, so we started doing, you know, the initial basics were community-based job fairs, veteran-based job fairs, with electeds that were sponsoring them, or with L.A. County, with Supervisor Solis's office. But we had to do more.

And so, what we're now doing in working with Rio Hondo College and L.A. County as a whole, is developing a curriculum that will lead to graduates that will become direct hires within Proterra. As well as looking at the myriad of let's just say diverse workforce that may or may not be underrepresented in this kind of good job economy of manufacturing. And that includes reentry

folks that have experienced the U.S. prison system.

We are really aggressively hiring women for our manufacturing jobs. We're working with an organization called Daughters of Rosie, named after Rosie the Riveter, interestingly enough. And we've already hired some of their people and we're working with them more and more.

There's an organization called Defy Ventures that is -- that does work on reentry. And, of course, diversity as well. You know, we're trying to hire -- because we're in the City of Industry, we're surrounded by a fairly diverse community, so we want to make sure that our workforce is diverse. And, quite frankly, it is very diverse.

But we were, in many ways, hiring people that were at times a little under qualified, and having to, you know, train on the job or, you know, bring them along a lot more slowly, when we would have been much happier to have people that had gone through a training process that they could hit the ground running.

Because, you know, we need to -- as you well know, we need to scale manufacturing and it's one of these things where you can only bring on so many inexperienced people at a time and get them up to speed. And then, you know, it's the old -- get them working

because we have to maintain a level of quality, and quality control. So, you can't -- even though, you know, we could hire. For the amount of work we have, we can hire 50 people. But there's no way you could absorb 50 people into that factory, building buses, and not have it turn into chaos.

So, the more ready they are to hit the ground running, if you will, from the electrical side of things or the mechanical side of things, the better it will be for Proterra.

And we're starting to get folks, we're also working with Goodwill Industries down there. They have an association with Rio Hondo College, as well. And so, we're starting at, you know, getting more and more folks that are more well prepared than hiring, say, somebody that used to work at Jiffy Lube. Because, quite frankly, that's what we did. We would hire people that had worked at Jiffy Lube, or even, like something even remotely similar in a factory, when we were first staffing up.

But we have to get better. We have to get smarter. Because as we bring more and more, let's say sophisticated manufacturing components in house, we need to have a more, and more sophisticated workforce. And that doesn't necessarily mean that we need to go camp

out at four-year colleges. We just need to make sure that the folks that we're hiring are getting the appropriate training to work within out industry and advance in our industry.

MR. DEALBA: I just want to give you all an opportunity to chime in if you have anything for that one. If not, we can move on to the next question.

All right, thank you, Kent.

So, number three is describe planning and development issues associated with charging/refueling infrastructure that support deployment of your zero emission vehicle technologies.

I'll look to you, Jasna, to start this off. I know they're not your zero emission vehicle technologies, but your organizations certainly have zero emission vehicle technologies. So.

MS. TOMIC: Right. No, good question. So, as I was sharing earlier, the projects that were initially funded, these 10, 11 projects, pilot projects, demonstration projects that were funded were usually for one unit, one bus or one truck. So, infrastructure at that point was not that difficult.

The projects that, however, followed those were then including either seven buses, or ten buses, or larger number of trucks. Their infrastructure became a

different conversation. How to prepare for it, how to build for it, and what all needs to be done.

And in those situations, what sometimes happens, unfortunately I'm going to illuminate a problem, is that the bus or truck technology will arrive, but won't be put in service because the infrastructure is not ready, yet. And that, then, causes delays of sometimes on the order of years to get, you know, the implementation going.

Because infrastructure, unfortunately, doesn't just involve just the fleet and the manufacturer, but it involves a utility, it involves the city, the planning. Those parts are a little more complicated.

So, I guess my advice and kind of note on that point is when we're planning infrastructure and we're planning these larger projects, we really need to have those relationships developed with the city planners, with all the pieces along the supply chain, if you will, of all the parties that get involved to get that infrastructure in place. It's something critical.

And then, with the utilities, for sure. So, as part of this, something that we have been working on and we've actually engaged with -- that's another CEC-funded project for DASH buses, down at LADOT. Those are BYD buses. And then, we've engaged with L.A. Department of

Water and Power how to, you know, electrify that. The next phase of that is L.A., city of L.A. wants to go all zero. The mayor has that definitely in his plan.

So, in the next phase of that, how do they electrify their entire fleet. So, they're, you know, looking deeply at what needs to be done at the level of the transit, LADOT, to electrify their entire fleet.

Another example is we were working with South Coast AQMD that had a project implementing electric school buses, with 18 schools in the district. So, then, they looked to us -- actually, Edison came to us and said help us work with these schools to get them ready for the infrastructure. Again, because giving just the money to the school for the bus is one thing but getting the school ready and who -- you know, that type of advice or taking them through the steps to get the infrastructure ready in time when the bus comes was different work.

So, I think the main message is we need to have all the parties on board. We need to engage with the utilities and the planning pieces. And, we're finding it's really helpful for all these fleets to really sort of understand that up front.

So, what we're developing, as part of some of the programs we have we're developing these two-pagers,

three-pagers of here are the stepping stones. Here are the phases you need to go through when you install infrastructure. Here are people you need to contact right before. Because it's not an issue like, okay, I'll get the truck or the bus, then I'm going to get the infrastructure. It actually needs to go sort of beforehand.

MS. CASWELL: Yeah, I have a lot of thoughts about infrastructure.

MS. TOMIC: I'm sure you do.

MS. CASWELL: And I'll echo what you just said about timing. We certainly run into that challenge at the Port. And as Ben alluded to, you know, we're a city department. We are an enterprise department for the City of Long Beach. We don't own or operate the equipment. But we do provide infrastructure as a service and then, the terminal operators will repay back the cost of that infrastructure through their lease.

So, we do have, you know, these technology projects and we are putting in infrastructure for a couple of them. And we have to go through the public bidding process and it's long. It takes us probably eight months to over a year to really even start construction.

In terms of some of the project level challenges

that we've run into on infrastructure, they really relate back to how the terminals are set up. So, the terminals are designed to bring as much cargo through the ports as physically possible. And that space for the containers is expensive real estate.

And I think what we've really learned through the EV blueprint, through our outreach, through these projects is that there' a little bit of a knowledge gap between the technology developers and the terminal operators on how much space we have for our charging stations. So, even as we're going through the process of designing some of the infrastructure, some of our developers have had to actually adjust the size and the design of their equipment, which makes it really hard to design and go through a bid process until you have a finalized product. So, that's one element of infrastructure that's been a challenge.

Another one is related to UL certification. So, the City of Los Angeles, the City of Long Beach require that UL certification of those charging systems, as well as any battery storage, and it has to be the whole system, not just pieces of the system. And, unfortunately, that certification takes a long time. So, folks coming to the table with a project for a grant, who haven't gone through that, and there's not

enough timeline on the grant, aren't necessarily going to be successful as they're going through that permitting process with the ports.

Fortunately, you know, we've been able to work with our technology developers and get that third-party certification and really work through it. But it's really been identified to us that we need to be doing some more outreach with folks on what the requirements are to do business down at the port, and to install that.

I do want to highlight one other component, just related to charging challenges at the Port. And that's the knowledge gap on how frequently the vehicles need to run. It came out in the EV blueprint process and it was pretty amazing to see. We had brought together many stakeholders, including the terminal operators, the environmental justice groups, the regulatory agency, ports, looking at -- you know, the utility folks came in. And we asked a series of questions. We sent out a survey and we asked do you believe the terminal equipment needs to run over 16 hours?

And 60 percent of folks who were not terminal operators or the ports said, no, they don't need to run longer than -- I'm sorry, let me say that -- go back in. Seven percent said, yes, they do need to run longer.

And in contrast, for the terminal operators, 60 percent said yes, they need to run longer.

So, the technology isn't building to that 16-hour requirement, which is made up of two shifts down at the Port, which is what the diesel counterpart can do, and what the expectations of the operators are.

And that plays into infrastructure. And I think that's something I really wanted to highlight here today is how do we, you know, moving forward address those things. And I think we really tried to highlight that in the EV blueprint is we need charging standards. We need greater outreach related to how the terminals operate. And we certainly need more funding for all of the infrastructure that we need.

MR. DEALBA: All right, thank you.

I just want to let Kent chime in here, because I want to hear what you're doing as a manufacturer to work with your potential customers.

MR. LEACOCK: I'll just say that all I need to do is echo what they've said. And I can just tell you that the bigger the project, the longer it takes.

And just as a way of example, even now, when we have a small pilot project of five buses or so, you know, we generally try to start the infrastructure at least six months before they're thinking about getting

delivery of the buses. And if it's a 20-bus, then it's over a year to get it all done from the design, to building a load profile, the load that you will need to charge those buses, and then interacting with the utility.

Now, time has been -- here, in California, that time is cut down a little bit because we have the attention of the utilities. Four years ago, you couldn't get the attention of the utilities because we were just so small and insignificant that it was like, oh, yeah, yeah, we'll throw a couple of chargers up when we have a chance. But now, they understand. But that's not the case across the U.S.

So, here in California, I would say that you still need, especially as projects get bigger and bigger, and they look at like, you know, potentially electrifying an entire division, say, a hundred buses, you should at least start a year and a half on that, just on the infrastructure piece of it. In terms of the design because there's space constraints.

And because, as a kind of reverse issue, the bus yards are -- they're designed to cram as many buses in as small a footprint of expensive L.A. real estate as possible. And so, then, where are you going to put the chargers? So, it's similar to the containers, except

it's buses that are going to have to move in and out of there under somebody driving them, without wreaking them.

So, I'll just end with you've got to start way, way in advance. Pretty much the instance you get a signed contract to build the buses, you need to start designing the infrastructure and getting it ready for installation.

And it was so important that we actually started our own internal infrastructure group made up of former utility guys, and a guy that ran the Supercharger network for Tesla that, you know, had a lot of experience doing that. And that is really one of the things that saved us.

Because before, when it was onesies and twosies, you could just about find a contractor in any city and any area that had done a couple of charger installations, because that's all you really needed. But not anymore, it's a project.

And so, the other, the last thing I'll say is that you need to be wary because now that it's a real business opportunity, people are springing out of the woodwork that will make any claim they possibly can to get your business. And we've seen it happen.

And as you were talking about the different

providers that have fallen by the wayside, well, now, we're in a different cycle of folks that are going to fall by the wayside. And that will be the infrastructure, design and, you know, kind of like, oh, we can do everything, software management design, all that stuff, they're going to be falling by the wayside as we progress in this electrification future.

MR. DEALBA: Great, thank you.

We've got about five minutes left, but I still want to get to number four. And then, maybe we can do sort of shotgun closing comments at the end.

So, to sum it up, really, how are your projects benefitting the communities, including disadvantaged communities, and do you see anything we can do to improve the Clean Transportation Program's approach to benefitting communities?

And Jannet, I'll look to you to start and then maybe we'll just go around the table real quick on this question.

MS. MALIG: Most definitely. I think in disadvantaged communities, you know, when we look at the Port and areas like that there are, there's a significant gap, especially when it comes to workforce and knowledge about what that really means for us.

And I think the more we're out there, and we

could develop it, and we could build -- for me, when I look at building the workforce, it's really important, disadvantaged communities. And we always look at that and we look at how we can build it, how we can make the community better, how we can make the air quality better. And I also think that means looking at workforce and what does that mean from building within the communities and hiring from those communities.

And, you know, we talk about all of the infrastructure. You know, we forget about the fact that we're going to put infrastructure and what does that mean for maintenance? What does that mean for facilities? That's a completely new job market and a job skill set.

And I think when we look at disadvantaged communities and being able to assist those, that that's really where our focus is. And when I look at education that's really important for me. You know, I look in the Central Valley, I look in, you know, the Imperial Valley, San Bernardino area, they really see a big difference in economy. And the implementation of these types of technologies that really kind of help the economy. So, we're excited to see that and hope that that continues in those areas, and that we could really develop that, the job market for those areas.

MR. DEALBA: Morgan.

MS. CASWELL: I think, you know, the obvious benefit is the emission reductions associated with our projects. Another benefit is the short-term construction jobs that come out of these projects, and those certainly benefit our local workforce as well.

I think in reference to what the Clean Transportation could do is continue to do what you're doing. I think for us, what came out of that EV blueprint process was we need funding for terminal-wide master plans on how we're going to put infrastructure in and what equipment we're going to use. I think we've learned that these one-off projects, while they're incredibly important to advancing the technology, they're not as cost effective as it is to look at the entire terminal operations and how you transition.

I think we should continue to fund the trainings that will be necessary, provide some funding into development of those trainings.

And then, on the terminal side, on the demonstration side, I think we need to continue to demonstrate a variety of charging options. You know, we've got some automated charging on some of our projects. We do have manual charging. But one of the challenges that we're seeing with that manual charging

down at the ports is that the cables are very heavy and some labor unions won't use those. So, it's important to also consider automated, as well as battery swapping may be a better option for some of our terminals, rather than having charging stations all over the terminal.

So, I would just encourage you to look at that and then, again, the infrastructure needs are significant, so continued funding for that.

MR. DEALBA: Kent.

MR. LEACOCK: I'd say that there's multiple, you know, benefits. Number one is the job creating right with in the community there, for building the buses. And as we continue to grow this market, we'll keep adding jobs to build, you know, more and more zero emission buses. And it's not just Proterra and our buses, it's all the other manufacturers of zero emission vehicles that have sprung up within California, up and down the State.

Then, you have the added benefit of zero emission buses running in disadvantaged communities, reducing the carbon footprint, mobile source pollutants, the whole myriad of greenhouse gas elimination that you get.

And then, on top of that is more dimension. Not just in the port, but you have these big infrastructure

projects that are -- in our case, we are actively recruiting using IBW Union workers to do the electrical infrastructure. Because, you know, as I like to tell people all the time, electricity is not your friend, and it's a highly dangerous, you know, kind of high -- you know, because we use high power charging technology. So, we want that job creation, but we want it to be done safely and we want -- because we want everybody to go home at the end of the day. And when it's all done, we still have the maintenance, ongoing maintenance of those high-power facilities. So, there's construction job creation and maintenance, and then ongoing, you know, kind of employment.

So, I think that, you know, from my perspective the Energy Commission is doing the appropriate thing in terms of, you know, you've now funded a lot of these different kind of pilot projects. I think if the opportunity prevails to fund, you know, more scaling projects for here in California, as well as then kind of also looking at scaling some infrastructure projects in terms of a how-do-you-charge-it-scale for a port that is going to have a bazillion, you know, trucks coming in and out every day and needed to charge at -- you know, because you're going to run 16 hours a day, two shifts, which is something that we don't have to worry about in

the bus world, we can charge overnight. But if you're going to be going, you're going to need hands free, and you're going to need high power, more than what's probably anticipated. So, there's probably some, you know, in the next phase of electrification pilot projects that need to be looked at, as well.

MR. DEALBA: Thanks, Kent.

Jasna.

MS. TOMIC: Yeah, so, I think I'll repeat probably things that were mentioned. The immediate benefit is the cleaner air. So, all the school buses, the transit buses definitely serve communities and provide that cleaner air.

A lot of the drayage truck projects and the projects that happen in those zones then, you know, contribute to the still not solved problem, but contribute to solving the problem of cleaner air in and around the ports.

And then, the other value that it provides is, as we mentioned earlier -- and some of the school bus projects, really interesting, is then the schools are developing these programs, educational programs. So, the kids within the high schools are then ready, you know, and engaged to this technology. And then, getting training associated with that is great.

And finally, what I would say is these projects then provide really good examples, how to replicate, how to grow from it, and that has been an extremely good experience.

MR. DEALBA: All right, thank you very much. I think we ran out of time. So, unless you have any burning comments, I think we need to wrap the panel up.

Okay, thank you all very much. This is a very great conversation. I thoroughly enjoyed it. And thank you, again, for all the work that you do.

I'll pass it back to Larry.

(Applause)

MR. RILLERA: Great, thank you Ben. Thank you, panelists.

We will now move into our third panel. We will have Seungbum Ha from the South Coast Air Quality Management District, Sarah Gonzales from Pixley Biogas, Erin Donnette from World Energy. If you would come up to the table.

All right. Elizabeth John will be moderating the discussion this afternoon for the panel. Elizabeth.

MS. JOHN: Good afternoon. My name's Elizabeth John and I'm a Manager at the Advanced Fuels and Vehicle Technologies Office, in our Fuels and Transportation Division.

And our last panel of the day, today, will focus on projects that result in low and very low carbon fuel production and usage, which is really important to our Clean Transportation Program investments. Emerging technologies and waste resource utilization for the production of low carbon fuel have had a role in achieving our near-term climate and greenhouse gas reduction goals.

So, each of the projects represented on the panel today highlights the project successes and benefits accrued to their distinct markets and technologies. And so, we have an exciting panel. And I'm going to let them introduce themselves. Like the panels before us, they'll each have about five minutes to discuss what Clean Transportation Program investment has meant to their project, what was accomplished during the project term, and why it was significant, and the next steps for their project and opportunities for potential replications.

And then, following introductions, I'll ask the panel the six questions we have on the slides behind us.

But with us today, we have Seungbum Ha from the South Coast Air Quality Management District, who will be talking about the Low NOx Engine Project. Sarah Gonzales from Pixley Biogas Project and Calgren

Renewable Fuels. And Erin Donnette, representing AltAir Fuels Project and World Energy.

And then, attempting -- we're attempting to get Paul Relis from CR&R on the phone, but he's not yet with us.

So, let's start with Sarah and then we'll go around the table for introductions.

MS. GONZALES: My name is -- can you hear me?

MS. JOHN: A little closer. That's fine.

MS. GONZALES: My name is Sarah Gonzales. I work with Calgren Renewable Fuels. We own and operate Pixley Biogas, in Pixley, California. We received a $4.7 million grant to build an enclosed anerobic digester in the City of Pixley.

We use liquid manure from a dairy that is about one mile away from us. We reduce the short-lived climate pollutants on that dairy by about 10,000 metric tons a year. That's 10,000 metric tons of CO2E. We can use the biogas either on site, at our own ethanol plant and power production plant, or that biogas could be cleaned up and used to make CNG fuel. CNG made from biomethane is a very low carbon fuel. We see numbers in the negative 375 to negative 400 CI.

So, this project has not only reduced emissions in a very disadvantaged community in the Central Valley,

but it has also helped reduce the emissions of a power plant located in the same facility.

MS. JOHN: Great, thank you.

Let's go to Seungbum.

MR. HA: Good afternoon. My name is Seungbum Ha, Air Quality Specialist, and I'm representing South Coast Air Quality Management District.

South Coast Air Quality Management is air pollution control agency for all of Orange County and the urban portion of Los Angeles, Riverside, and San Bernardino Counties.

This region historically experiences the worst air quality in the nation due to natural geographic and atmospheric conditions in the region, coupled with the high population density, and also city mobile and stationary source emissions.

So, I work for Technology Advancement Office at AQMD. Our office mostly focuses on research development, demonstration, and accelerating the deployment of clean fuel and transportation technologies

The overall strategy of our office, in large part on emission reduction technology needs, identified through the Air Quality Management Plan process, and AQMD governing boards directives to protect the health of approximately 17 million residents. Near half of the

population of California in the South Coast Air Basin.

The AQMP, which is updated approximately every four years, is long-term, regional of the lion's fair share emission reductions from all jurisdiction levels, federal, state and local. The 2016 AQMP, which was adopted by South Coast AQMD governing board in March 2017, is composed of stationary and motor source emission reduction from stringent regulatory control measures, (indiscernible) based programs and project co-benefit from climate change program, and mobile source strategy, and reduction from federally regulated source.

The emission reduction and control measure in 2016 AQMP rely on mix of currently available technology, as well as expedited development and commercialization of lower emitting mobile and stationary technology in basin to achieve health-based air quality standard.

So, the 2016 AQMP project that the approximately 45 percent reduction in NOx is required by 2023, and an additional 55 reduction by 2031. The majority of this NOx reduction must come from mobile sources, both on-road and off-road. AQMD's currently one of two regions in the nation designated an extreme ozone nonattainment area.

So, we are supporting a variety of projects and technologies, ranging from near-term to long-term R&D

activities. So, on this technology portfolio try to provide AQMD's ability and flexibility to leverage state and federal funding, while also addressing the specific needs of the South Coast Air Basin.

So, the project of studies in our office included diverse mix of advanced technologies. So, significant electric and hybrid electric technologies and infrastructure to develop and demonstrate medium- and heavy-duty vehicle in support of transitioning to a zero and near zero emission goods movement industry.

And fuel and emissions studies to conduct the in-use testing and field characterization, and development, demonstration, and deployment of low NOx displacement, natural gas engines, and continue demonstration and deployment, electric charging infrastructure, and natural gas, and renewable natural gas deployment and support.

So, in summary, advanced energy and renewable technologies are needed not only for attainment, but also to protect the health of those who reside within the Air Basin jurisdiction, reduce long-term dependence on the petroleum-based fuel, and to support more sustainable energy future.

So, this is overview of what we're doing, now, to provide, and then I'll be happy to provide a little

more detail of a specific pilot and demo project later on in Q&A session.

MS. JOHN: Thank you.

Erin.

MS. DONNETTE: Good afternoon. I'm Erin Donnette from World Energy. I'm the Director of Government Relations.

The project in question today is the AltAir Fuels Project, which is located at our Paramount facility. This facility was -- or this project was co-located on an old petroleum refinery that was ramping down. It was a business that was kind of not well received in the community. And so, our project is one that came in to try to utilize the remaining personnel and a lot of the equipment to show that a renewable fuel project could replace a petroleum project.

And you can see on the slides these are all the individuals that we were able to retain. And Bryan Sherbacow, in the middle, was the one who started the program.

Last March, our site was acquired by World Energy and we are now working on the next stages of this project. It's a multi-stage setup to where the -- each stage builds on itself so that we can be cost effective as we move forward with it. So, we are currently

producing 3,500 barrels a day to 3,700 barrels a day of renewable fuels, ranging from renewable diesel all the way up to renewable gases.

But the most significant of what we do is create a renewable jet fuel. And we're the only commercial producer of this in the world. And we supply primarily to United Airlines.

The CTP Grant was critical to stage two. If we had not received it at that time, we wouldn't have been able to do the necessary steps in order to build onto phase three, and we wouldn't have been able to be acquired in the way that we were, by World Energy, leading us to this next conversion project.

Which, at that purchase time, we received the entire 65-acre facility. And we are working on converting the remaining equipment within that, as much as we can, to increase our production to 20,000 barrels a day, which will equate to about 10 percent of diesel in California. So, it will be a significant increase.

And specifically, for the jet fuel production, we have a lot of demand for it. We just don't have enough product to go around. So, it's a good problem to have.

But the CEC grant was critical to allowing us to that next step and we're excited to continue working

with the CEC as we do more.

MS. JOHN: Wonderful, thank you.

So, the first question I have is to everyone. And I know the group has touched on it a little bit, but if you have anything to the question what role did the Clean Transportation Program investment play in your project?

I'll start with you, Sarah.

MS. GONZALES: I would say that the role of the grant we received from the CEC to build Pixley Biogas was instrumental in the actual building of Pixley Biogas. We are an ethanol plant. We did not have any experience in the world of anerobic digesters. We were kind of taking a risk and the grant made it possible for us to do that.

Since then, we have one anerobic digester online, on site. We have built four additional anerobic digesters offsite, with the total plan to be 25 anerobic digesters to be built offsite in the Tulare County, general Pixley area.

So, we have been able to use that one grant to build one digester, to expand the project to include 25 dairies total.

MS. JOHN: Wonderful.

Seungbum, do you have anything?

MR. HA: Before getting to the impact of the Clean Transportation Program, I would like to give a little bit of background of our history of our demo project on near zero and zero emission technology.

What we have seen in passenger vehicle sector in 1997 Toyota released the first generational hybrid car and the Prius, and they gradually penetrated into the market with the help of increasing gas price and more concerns about the emissions.

The Prius was very successful in the market and so, other auto manufacturers started developing electric powertrain vehicle to compete with them.

In the meantime, from the portable device field, cell phone, laptop, they dramatically improved lithium ion battery technology and the battery price went down about 80 percent within ten years.

So, with that, in 2011 GM applied a lithium ion battery to Chevy Volt plug-in hybrid, with 30 miles EV mode. And in 2012, Tesla released a pure battery electric, Model S.

Now, we can see Chevy Volt having over 200 miles with under $40,000 plug-in hybrid, with 60 miles EV driving.

So, passenger sector has led the development of this new technology. And now, we are looking at

changing medium- heavy-duty sector. AQMD has supported research and pilot project on near-zero and zero emission technology since the early 2000s. One of our, the first generation of major project started with an award of approximately $4.2 million from DOE, in 2012, which is exact to one project.

The AQMD has contracted with two local EV integrators to develop and demonstrate total 11 zero emission capable heavy-duty drayage truck based upon battery electric and hybrid powertrain.

And in the meantime, AQMD started low NOx engine development project with the support of CEC. The development of CNG certified 90 percent below the existing carbon-heavy duty engine NOx standard, under the optional low NOx standard has led to successful development production and commercialization of two CNG engines, including 8.9 liter and 11.9 liter.

So, in the market, people used to say 9 liter and 12 liter now.

So, these commercialized near-zero CNG engine provide additional and vital support toward California's effort on lowering heavy-duty engine standard, as well as AQMD's petition to USEPA for a similar national standard.

So, the (unintelligible) -- using cost sharing

from AQMD, CEC Clean Energy, and Southern California Gas Company was able to obtain carbon USEPA certification for both engines at .02 for NOx.

So, intended pathway to commercialization was very successful and both engines are now in production. So, more than a million miles of successful demonstration prove the engines are ready for commercialization, with the 9-liter engine in (unintelligible) truck and other vocational trucks, as well as transit and school buses. And then, 12-liter engine in Class 8 drayage truck and 60-foot transit buses.

So, this is not end of story. So, we received the award, approximately $10 million from DOE to develop and demonstrate seven zero emission drayage trucks in real world drayage operation at Port of L.A. and Long Beach in 2014, which is the second generation of project that I mentioned earlier.

So, six of them will be the fuel cell range-extended truck and the remaining one truck is based upon CNG hybrid platform, which is using 8.9 low NOx CNG engine developed by CEC-funded project, previously.

So, South Coast AQMD received an award, approximately $24 million, from ARB to develop and demonstrate zero emission drayage truck under ARB's Low

Carbon Transportation Greenhouse Gas Reduction Fund Investment Program in 2016. So, this project is to develop total of 44 Class 8 drayage truck, including battery electric, CNG hybrid and fuel cell.

AQMD also received another funding from CEC under Alternative and Renewable Fuel Vehicle Technology Program to develop and demonstrate the near-zero emission technology in drayage and cargo handling application, including 20 repowered drayage trucks with 12-liter near zero CNG engine, and battery electric, and plug-in hybrid electric drayage truck using 8.9 CNG engine, and pure battery electric top handler.

So, this project is ongoing. And recently, one of the fleet operators in this project purchased new 12-liter CNG engine trucks for their business.

So, this is kind of the long story from all the research phase to commercialization. But again, we really appreciate for CEC support so that we can digging on the ground from all the phase of research and, then, we're now seeing the real commercialization in the market. Thank you.

MS. JOHN: Thank you.

Erin.

MS. DONNETTE: The most significant role that the CTP investment played in our project was that it

allowed for increased capacity and the ability to process different feedstocks. Feedstocks are probably one of the most critical pieces to what we do to make the clean fuels. And currently, we're using fats, oils and greases, largely agricultural waste.

There is, as production increases at different plants throughout the country, state, wherever, there's going to be -- there's already starting to be a little bit of a bottleneck in reaching those feedstocks.

And so, we need to have the ability to process many different types. And so, as I mentioned, this being a multi-stage process, the grant helped us to build in such a way that we are ready to take those next steps and be able to process those different types of feedstocks, such as cellulosic, and other things that have yet to be discovered.

So, we're just anticipating that and hoping that as we continue to move that we'll be able to have lots of access to different things.

MS. JOHN: Great, thank you.

So, I'm actually going to skip to question three and I'm going to ask Sarah, what is needed to replicate or otherwise enhance the scale of your project within California?

MS. GONZALES: What we would need to enhance our

project, because we are actually in the process of replicating it several times over, but what we need to enhance our project is not just support from the CEC, which we have gotten in the past and we've always felt that the CEC has been a friend to biomethane, and anerobic digesters, and the industry as a whole, but we need to feel that on a statewide level. We need to be able to monetize LCFS from biomethane. We need to know that vehicle vouchers are going to exist in the future for conversion of a diesel engine over to CNG.

And so, those are some of the problems that we have and that really face industry as a whole. Because if there's nowhere for you to go with your gas, there's no reason to capture it. There's no reason to put in that investment.

We received a $4.7 million grant to build one digester and have now put in almost $45 million of private investment to increase production of biomethane and reduce emissions in the Central Valley. But if there's nothing to do with the gas, those projects will just end.

MS. JOHN: Thank you, that's good information.

So, I'm going to direct question four to Erin. What do you see is the next transformative technology and what is needed to bring the technology to market and

increase market adoption?

MS. DONNETTE: So, as I mentioned, the next step in feedstocks is really looking towards cellulosic and being able to have that ability to process many different types of feedstocks. And so, as we're moving into the next part of our conversion, as we're taking over the entire 65 acres and increasing our production significantly, we need to make sure that we can process different things.

Like used cooking oil is one that is, you know, very dirty, but it has a very low CI score and it's -- there's a finite amount of that out there. So, it's not something that increases in production over time. It's just it's there, it's processed, everyone's fighting for it.

And so, we need to have different things on site, such as a pre-treat facility to be able to clean it up so that we can put it through our process.

Cellulosic is similar in that way in that it needs special equipment in order to be able to put it through the process to receive the same type of refinement.

So, the thing to remember with our fuels, too, is that biodiesel is a chemical process. Ours is a refinement process identical to what you would do with

crude oil. So, it's basically, you know, these are our types of crude, these different feedstocks. And that's really the main thing that we need to be able to work on and to have the ability to put on property.

And it is difficult. Working through AQMD and working through local governments, and things like that to be able to have access to these things on site takes time. And as that takes time, then it takes away from our ability to be able to create more of this low carbon fuel for, you know, the communities to benefit from, from the low emissions. So, that's largely it.

MR. RILLERA: Great, thank you, Erin. I want to pick up on a point that Sarah raised and that goes to your market, your consumers. Can you talk about how you've done some outreach, marketing and how that's different for your technology and your product?

MS. DONNETTE: Yes. So, we have many different groups that we're reaching out to. And, you know, one of the things that I've noticed coming from the government sector into this role is that there really isn't as much discussion about renewable fuels, as there is about, you know, electrification and other things like that.

But we play a critical role in being able to get to those next steps. There are certain things that are

just going to, if they ever get to that point, take a very long time to electrify, such as airplanes.

But we have that ability to provide a solution now, and it's really critical to those communities that are surrounding it. So, I do a lot of community outreach, making sure that local governments and even the school districts and, you know, the communities itself understand what our fuels do in their particular backyards.

So, the decrease in emissions from -- let me back up a second. So, with airplanes, the vast amount of emissions that you'll see is from take off and landing. That's where you'll see the significant portion of it. Our fuel cuts that down by about 60 percent. And it also creates a little bit of efficiency. At least that's what we've seen from the results that we've received back from United Airlines. It's the fuels are just a little bit more efficient because they're lighter and cleaner, obviously.

So, really, just making sure that we're educating everybody about this opportunity. We participate in local events and showing them directly that this is something that they can use, and that it is a drop-in fuel. And that it's something that there's zero modifications needed for on any of their vehicles.

So, their classic car that they love and don't want to get rid of, they can use our -- we actually have some other fuels coming online very soon. Friday, tomorrow, we'll have one that will be used in flex fuel vehicles. We'll have the first renewable E85 available.

And we have a gas station in our community that's currently buying our renewable naphtha blend. So, taht means that I can drive down the street, fill up my tank, and drive away feeling pretty good that I'm not polluting as much as I would be in the neighborhood that I work in.

So, it's -- there's a lot of efforts that we do for outreach and making sure that people understand it's out there.

MS. JOHN: Great, thank you.

So, question five I'm going to give to Seungbum. As we start moving towards more ZEV technologies and infrastructure, what role do you see low carbon, clean air projects playing in California?

MR. HA: I would start with lessons learned of what we are doing in those demo projects and pilot projects so far. So, I want to summarize the three key words. The first one is cooperation. The second one is consistency And, the third one is momentum, the market.

For the cooperation, a successful demo project

can be achieved by cooperation of all entities and stakeholders who are involved in the project. Not only development of new technology, but also, we need a fleet operator and customer who can bravely participate in the project. Reliable part, funding agency, vehicle integrator, and et cetera.

So, as a government agency, we keep increasing these entities to accelerate deployment of new technology.

Consistency, commercialization of near-zero and zero technology cannot be acquired by a single project. So, CEC's funding program are able to keep improving the technology, having wider deployment, and continue to take lessons learned from the former project.

And the third one is momentum of the market. It's been about ten years for us, since we started major demo project in this field, and now we are seeing that tier 1 and tier 2 powertrain manufacturer have been acquired by large OEMs, and major OEMs are participating in this market we are getting more and more interest and focus from the customers and market as well.

So, we developed -- as a government agency, we developed regulation that support other agency, and private sector. But we should not even markets and momentum, once we lose the momentum it will be very

difficult to move forward this technology, even if pushing really hard. So, we should keep eye on it and supporting this area.

So, the major role of this low-carbon project, in between conventional internal combustion engine technology and zero emission technology.

So, these lessons learned from both low-carbon project as well as the zero-emission technology. But as we all know, our ultimate is zero emission, which will be either fuel cell or battery electric. But again, as we all know this technology comes with long lead times, so even the large OEMs, major OEMs are participating in this market, their time frame for commercialization will be, optimistically, it's sometime in 2021. And then, we never know the real commercialization will occur, especially for long-haul drayage trucks.

But this, the low-carbon technology, especially for low NOx CNG engine, and low NOx diesel engine as well. This technology will be the interim between conventional internal combustion engine and zero-emission technology.

And also, we have a lot of existing infrastructure near the port, and near the warehouse, so we don't have to worry about the permission and construction time for the new infrastructure

construction for hydrogen fueling, and the large capacity of the battery electric charging infrastructure.

So, all those things. So, I would not say the low-carbon technology will be the final, the best solution for our emission reduction goal, but definitely it will have -- it will lay a really, really important role as the interim position.

MS. JOHN: Thank you.

So, I'm going to ask question six of the whole group and then, I'm also going to go back to question two. So, I'll give you a chance to think about that, but I'll ask question six, first.

Sarah, so can you describe some best practices or lessons learned from your respective project?

MS. GONZALES: Yeah, I've actually thought a lot about how to answer that because I've worked on this project since before construction, so since 2012 I've worked on this project.

So, the lessons learned is quite long. But I'll leave it to something simple, as we'll go back to this idea of outreach.

When we first proposed to build our first anerobic digester, we did get a lot of push back from our local community. And it is a small community of

maybe a thousand people, and they did not want that project. And if we had maybe been more out front with what the actual project was, we probably wouldn't have gotten as much push back.

So, as we look to expand, we know we have to be out in front. It's made our company become a much bigger participant in our small community. We are a small company, too, we only employ 40 people. So, we are a small company inside a small community. And they thought we were a very large corporation that was coming in to do things to their water or, you know, kind of an exacerbated idea.

So, outreach was the biggest lesson learned. And then, as we operated the project and looked to expand, we had a better reputation in our community and so, they were much more welcoming. And even the local dairymen and farmers were much more welcoming to us.

MS. JOHN: Do you -- based on your learning of outreach, do you have any tips or suggestions on, you know, what should be incorporated into our program, or how to approach that?

MS. GONZALES: I think simple is better. Because I go to a lot of outreach meetings, now, for other projects and what happens is you go to these meetings and people, who are very smart, tell you very

complicated things in a complicated way. And even I, who sit here, who -- I do LCFS, I do CI, and they confuse me. I'm thinking, huh?

So, sometimes simpler is better. Sometimes just having a very general outline of these are the things we're going to do that is going to reduce emissions, make your air quality cleaner, and help your community by providing jobs. And that's really what people want to hear. They don't want to hear, you know, all these other big words and terms, and nobody knows what -- most people don't know what a metric ton of CO2e is.

So, when you go to an outreach meeting and you're trying to tell people what the emission reductions are in those terms, it goes right over their head.

And so, I think, especially when you're just looking at normal people, normal people want all the same things, they want clean air, clean water, and a safe community, and just make sure that you're providing those.

MS. JOHN: Great, thank you. That's really helpful.

I guess along -- let's keep on the fuel lines and maybe, Erin, you can provide us some best practices or lessons learned.

MS. DONNETTE: Yeah, I actually had a long conversation with Bryan Sherbacow, who is the founder of Alt Air Fuels, the project, about this particular item. And one of the things we both came away with was -- how did he say it? He said, don't be first, be second. But, you know, be second in line right after that person. Because the amount of time and money that has been spent, over many, many years, is ultimately paving the way for that next person. There's a lot of education that goes with it, just making sure. Even the regulators, so working with AQMD, working with CARB, working with CEC, making sure people understand what it is we are actually doing can be complicated.

And, you know, there's a lot of regulations that we just don't fall into because we're this weird thing, because, you know, we're a refinery, but we're not a petroleum refinery. We don't do anything of any refining of petroleum products on our property at all.

And, you know, like I vividly remember the first conversation we had with AQMD last year, where we're trying to lower the capacity so that we weren't falling into this weird reporting category. Because we simply were never going to be to that point of, you know, producing 60,000 barrels a day. So, we were trying to lower it just under that threshold.

And they're like, so, but what about the petroleum refining? We're like, we're not doing it. Okay, but what about it? I was like we're not doing it.

So, it's just a lot of repetition. And as you said, you know, getting out there and having that conversation with everyone and being as open as possible. And we really try to be very transparent about everything we're doing. I'm constantly arranging for tours of our facility, just so people can come in and see. Even if it's our neighbors. It doesn't even have to be an official of any sort. It can just be somebody who's curious, who lives across the street.

We do a lot of stuff with the high school, which is the largest high school in the State, directly across the street from us. So, we work with their science programs to have them come in and take tours and, you know, check things out. And we offer internships and all sorts of things. And, you know, just really being a part of the community and showing them that we want to be a part of their community and that we are a positive part of that has been, probably, the best thing we could have done.

And I really can't emphasize enough about how just having constant interaction with your local government, like even doing a concert in the park and

showing that, you know, you're there, and people can see you. They see the sign, you know, the banner from your company. And they see that, you know, you want to be a part of it.

We're a small company, too, in a, you know, very small city, in a very large county. Paramount is a really unique area. It's like 55,000 people and they're all very active, and everybody knows who we are. And the plant's b3een there since 1913. And so, for them, also understanding that we're not Paramount Petroleum anymore, is something that's taken a lot of time and education. But it's all worth it. And it's the thing that I think has made us the most successful is just being out in front of all of it.

MS. JOHN: Thank you.

Seungbum, I know we have a lot of projects with South Coast and we've partnered on a lot of innovative, new technologies. From your perspective, are there best practices or lessons learned that came out of your project?

MR. HA: So, in the previous question I already mentioned what we learned from the previous project. So, I just want to have one more comment on that. So, we are facing the diverse of new technology for the engine reduction. So, we're choosing including

(indiscernible) technology and the fuel cell battery electric hybrid. There are lot of new technology out there.

But we need to focus on those old technologies at the same time, in parallel, because each technology has their own sweet spot. And especially the fuel cell, it's very good for the long-haul drayage truck. And then battery electric it's the short and medium range of the truck, that is the best spot for that. Medium-duty truck, as well, the low NOx engine. So, it has very low incremental cost compared to fuel cell and battery electric vehicles.

So, as I mentioned before, that will be the very good transition technology between conventional and zero emission technology. So, we need to keep focused on those, all of the technologies.

And then, this cannot be done by only one agency or only one company, or individuals. So, we need to cooperate together to push hard to the market for the future. That's what we learned from the previous project.

MS. JOHN: Great, thank you.

So, I'm going to jump back to question two and ask Sarah to describe the benefits that have accrued to the local and regional communities from your investment.

I know you've talked about it some, but if there's anything you'd like to add.

MS. GONZALES: Yeah, so first off, it's just pollution reduction in our actual community. As I said, it was 10,000 metric tons just on one dairy, alone. And if you multiply that times 25, it's a pretty large reduction in emissions in that local community. And I don't know if anyone knows where Pixley is, but it is on the 99. It is in the middle of nowhere. You have blinked and driven through it.

But we suffer from high unemployment and some of the worst air quality. So, that's a really impact on that local community. And as we expand our project and include more dairies, these dairies now have a way to monetize their manure. So, they now make money off these projects, so that makes the dairy stronger. That means the dairies' are going to stay there. They're not going to sell and become an orchard of trees.

So, it provides money into the local community, it reduced emissions, and as of July 1st, we started injecting all of our gas production into the utility pipeline for CNG. And we supply a CNG refueler in the valley, also. So, that is now tailpipe emission reductions happening in our own local community.

MS. JOHN: Wonderful.

So, I guess I'll ask Erin the same question. Describe the benefits that have accrued to local and regional communities from your project?

MS. DONNETTE: I would say the same thing about pollution reduction. You know, being a transportation fuel producer, it's not just our direct community that sees it, it's any community that our fuel is being used in. And significantly, you know, around airports with the use at LAX, through United. It actually -- the fuel goes into a general tank. And so, it's every single flight that actually is going out of LAX is seeing a reduction. So, it's more significant than just one airline using this, which is pretty cool.

Also, the fact that the refinery that Bryan decided to put his project in, on the Delek refinery, the Paramount Petroleum facility was ramping down production. People were losing their jobs. It was a very bleak place to be.

And his project was able to come in and save quite a few of those jobs. We have, I believe, about 65 direct employees that were kept from that original refinery. And then, there's about 25 indirect jobs that are also from the community that are in there. And so, it was the saving of those jobs.

And as we have our conversion project completed,

we'll have an increase in jobs and we're planning on using local labor, and all sorts of other great things. And so, there's just a lot of positive aspects from that, that the community will see as we go forward.

And then, you know, one thing that people have expressed to me is how proud they are to have something so unique as the only jet fuel, renewable jet fuel producer in the world being located in their backyard. And so, they may look at our plant, which actually is really pretty. We have trees all the way around it. It's kind of nice, as far as refineries go. But it's something that they can look at and be like, yeah, you know, it's not so bad. It is really cool. And check out what we can do right here in little Paramount.

MS. JOHN: Great, thank you.

Seungbum, the same question to you.

MR. HA: Okay, similar answer for the question. So, two things. One is air quality improvement. The other one is job creation.

So, AQMD's primary goal is definitely improve the air quality in our South Coast Air Basin. So, especially near the ports we have many disadvantaged communities, and then that is one of the extreme ozone nonattainment areas. So, we are really concerned about the air quality improvement, especially in those areas.

So, when we apply this demo project, pilot project, and then the wider deployment of this new technology later on that will, that should improve the air quality in this area. So, that's out main focus.

And then, another impact is the job creation. So, as we all know that, so industries are changing, so we are having new industry for near-zero and zero emission technology. And then, all the OEMs and tier one, tier two companies, they all go through the new reconstruction for their organization, as well as some small companies are acquired by large OEMs. So, we are seeing a lot of changes in the market.

And, also, we launched two new large projects with Daimler and Volvo, which is major OEM for the heavy-duty sector. So, we have seen this project, we don't see in the previous project, but once the large OEMs participating to this area, they are -- so, the community college and then technology college, they are involved in the project because -- so, once large OEM came into this market they are -- they will be manufacturing a large number of new technology trucks. So, they're going to require a lot of new technicians and engineers.

So, the Volvo and Daimler, major OEM, they are developing their own training system, online offering

training system, as well as have the community colleges and technology colleges in the project so that they can educate the students, and then training their technicians for the future phase.

So, we already are seeing new job creation. And then, as we all expected, so this new market changing will have a lot of new job opportunity.

MS. JOHN: Thank you.

In the interest of time, I'm going to have everyone provide quick wrap-up comments, if you have anything more to add, maybe a couple sentences. It's up to you.

I'll start with you, Sarah.

MS. GONZALES: I would just like to say that these grants and the program that you offer does provide a lot of value, especially to emerging technologies or new fuels. And so, in keeping a diverse portfolio, I see us being very important in the future.

I think that we get really wrapped up in the idea of electrifying or hydrogen, but those are actually, I think, a lot farther out that people want to admit. And so, there are a lot of things that we can do right now that will reduce emissions in our State today, and that we're just not paying enough attention to.

MS. JOHN: Thank you.

Seungbum?

MR. HA: Yeah. Again, I appreciate the CEC support so far. And then, I'm looking forward to the future support, continued support for this sector as well. Because one other issue is that -- the reason is that, so, once we have the renewable infrastructure facility, this low-carbon sector will have synergy impact with that. So, please, yeah, keep pushing this area. Thank you.

MS. JOHN: Thank you.

Erin?

MS. DONNETTE: I absolutely concur with what Sarah said about the need for all of this. And that, you know, some of those other types of technology are a little bit further off and we need to look to what is doing -- creating improvements now.

And, you know, as I had mentioned before, without this investment from the CEC, we would have been at a critical stopping point and not able to move to phase three of our project. And so, we're very grateful that it was available and that we were able to do that, because where we are going is going to be a very exciting place.

MS. JOHN: Thank you. I want to give a big thank you to our panel. And we really appreciate you

coming and speaking to us about your successful projects.

So, I'll hand it back over to Larry. But thank you, thank you all.

(Applause)

MR. RILLERA: Okay, thank you.

We are now going to switch to -- that concludes our final panel presentations. We will now switch to the Clean Transportation Program Summary, Benefits Report Summary, and the Benefits Report Methodology.

Susan and Christopher, if you would like to come up for your presentations.

MS. EJLALMANESHAN: Good afternoon. I am Susan Ejlalmaneshan with the Fuels and Transportation Division. Today, I will be highlighting some of the key contributions of the Clean Transportation Program toward meeting the State's goals for cleaning the transportation sector.

(Pause)

MS. EJLALMANESHAN: Sorry about that. As some of our previous speakers mentioned, the transportation sector is the largest source of greenhouse gas emissions in California. When you combine local emissions with upstream petroleum extraction and refining it is roughly 50 percent of in-state emissions.

To meet the goals set in the State policy, the State transportation sector will need to transition to low and zero carbon fuels and technologies.

The Clean Transportation Program originated from Assembly Bill 118, in 2007, and provided up to $100 million per fiscal year to help address State's climate change policies. The primary charge of the program as captured here, is to develop and deploy innovative technologies that transform California's fuel and vehicle types to help attain the State's climate change policies without adopting any one preferred fuel or technology.

This slide captures some of the key policies guiding our implementation of the Clean Transportation Program. Our statue calls on us to provide preference to projects that maximize these and other goals. They include in terms of, let's say, greenhouse gas emission reduction, Assembly Bill 32, which sets a goal for reducing the greenhouse gas emissions to 1990 levels by 2020. Senate Bill 32 which extends that to reduce the greenhouse gas emissions to 40 percent below 1990 levels by 2030. And, finally, Executive Order B-55-18 which mentioned to achieve carbon neutrality by 2045.

Also, we have -- for air quality we have Clean Air Act, and California State Implementation Plans,

which both aim for 80 percent reduction in NOx by 2031.

And for increased zero-emission vehicles, we have Executive Order B-16-2012, which aims for 1.5 million electric vehicles deployed by 2025 and 5 million zero-emission vehicles by 2030.

And Executive Order B-48-18 for infrastructure, which aims for -- which supports 1.5 million electric vehicles by 2020. And 250,000 electric vehicle chargers, including in-house and DC faster chargers, and 200 hydrogen refueling stations by 2025.

It is worth noting that the Clean Transportation Program does not operate in a vacuum. Instead, our program supports and complements statewide efforts to decarbonize the transportation sector. This includes coordinating with a number of different agencies and programs, including Zero Emission Vehicle Regulation, Low Carbon Fuel Standard, Cap-and-Trade/Greenhouse Gas Reduction Fund, utility investment into charging infrastructure, settlement legal assessment that supports ZEVs and ZEV infrastructure, Air Quality Improvement Program, and Carl Moyer Program.

We are now in the eleventh fiscal year of the program, fiscal year 2019-2020. And in this table, you can see a very simple summary of where, approximately, $800 million in program funding has gone through March

2019. We have a broad portfolio of project types, fuel types, and technology types as shown. Everything from low carbon fuel production facilities to plug-in electric vehicle charges, to natural gas vehicles, to hydrogen refueling stations.

Our statute requires the Energy Commission to include an evaluation of the Clean Transportation Program efforts as part of each Biennial Integrated Energy Policy Report. This evaluation includes the list of funded projects, expected benefits from the funded projects, overall contribution toward transition to clean, alternative transportation fuels, identifying obstacles and challenges to access to clean alternative transportation fuels and, finally, recommendations on what needs to be done to reach to this goal.

The next slide summarizes a few of our key investment areas, beginning with ZEV infrastructure. Executive Order B-48-18 sets goals for deploying 250,000 EV chargers, including at least 10,000 DC fast chargers, and 200 hydrogen refueling stations by 2025.

Through June 2019, more than 600,000 PEVs were sold. CEC forecasts between 1.5 million and 2.4 million ZEVs by 2025.

The Clean Transportation Program's funding to date has supported infrastructure for more than 600,000

zero emission vehicles in California, roughly half of all such vehicles in the United States.

This chart, taking from Veloz, highlights the rapid growth of plug-in electric vehicles within the State. The green trend line is our cumulative sales number. Investment in charging infrastructure are necessary to support the continued growth of these vehicles.

Additionally, multiple types of charging infrastructure are needed to ensure that plug-in electric vehicle drivers can meet their transportation needs.

As mentioned earlier, Executive Order B-48-19 establishes a goal to install 250,000 EV chargers by 2025, of which 10,000 are DC fast chargers. These tables detail progress towards achieving these goals. Based on these goals and staff's estimate of currently installed and expected chargers, we see that there is still a sizeable gap in terms of both Level 2 and DC fast chargers. Between 75,000 and 85,000 additional Level 2 connectors are needed within the next six years, along with 3,000 to 4,000 DC fast chargers.

This table summarizes the type and number of Clean Transportation Program investment into charging infrastructure. I would note that this is through March

1, 2019 and does not account for active CALeVIP reservations. More than half of these Level 2 charging stations were installed at homes to support the early deployment of the first PEVs in the State. The residential fleet, workplace, multifamily housing, and public charging connectors consist entirely of Level 1 and Level 2 charging stations. The corridor charging stations consistent mostly of fast chargers, but many sites also include some Level 2 charging stations.

As of March 2019, the Energy Commission has approved nearly $125 million in Clean Transportation Program funding for 64 new or upgraded hydrogen refueling stations that will help serve an emerging population of fuel cell electric vehicles. Plus, the development of retail refueling standards to enable hydrogen sales on a per-gram basis.

These stations represent two-thirds of the initial network of 100 hydrogen refueling stations called for by AB8, or one-third of the way toward the 2025 goal of 200 hydrogen refueling stations.

As shown in this slide, our funded projects have also been broadening the geographic availability of hydrogen refueling stations. Green dots on this map represent open public stations and the yellow dots represent the planned stations we have committed to

funding.

Earlier, Shane Stephens mentioned the new ability to drive a fuel cell vehicle from San Diego to Tahoe. We are proud to have enabled that.

To date, the Energy Commission has awarded nearly $200 million to 71 low-carbon fuel production projects, as you can see in this table.

The California transportation sector presently relies largely on petroleum, which accounts for 89 percent of ground transportation fuel used in the State. Any low-carbon substitute fuel that can displace the roughly 14 billion gallons of petroleum-based gasoline, and 3.3 billion gallons of petroleum-based diesel use per year in California presents an immediate opportunity to reduce greenhouse gas emissions and petroleum use.

Biofuels, such as non-petroleum diesel substitutes, gasoline substitutes and biomethanes represent the largest existing stock of alternative fuel in California's transportation sector.

In addition, product of and demand for renewable hydrogen are expected to increase in the coming years as more hydrogen fuel cell electric vehicles are sold.

Fuel production projects that we have funded support in-state production of primarily waste derived alternative fuels. These projects also benefit

significantly from credits under the Low Carbon Fuel Standard and, in turn, support the State's ability to meet its near-term greenhouse gas emission reduction requirements within State investments.

This slide captures some of the investments we have made on the retail side, including both deployment and vehicle demonstrations. The first with deployment projects included natural gas and propane, represented near-term opportunities to bring quick criteria emission reductions. And in the case of natural gas, expand the potential stock of trucks that can utilize also low carbon biomethane.

Our hybrid and ZEV deployment projects have partnered primarily with the Air Resources Board, providing them with additional funding to backfill the Clean Vehicle Rebate Project prior to the availability of funds from the much larger Greenhouse Gas Reduction Fund.

We have also funded pilot projects to implement and evaluate low-income mobility opportunities using ZEV technologies.

The final row highlights the considerable investment we have made in demonstrating advanced vehicle technologies in the medium- and heavy-duty sector. Trucks and buses in this sector represent an

outside share of the greenhouse gas and criteria pollutant emissions within the State. However, they also have much more diversity in the configurations and operations, and much more stricter duty cycles.

We have also provided support for other related opportunities that support the aforementioned fuel infrastructure and vehicle projects. Our workforce training and development investments have reached more than 17,000 trainees at this point, with additional instruction programs developed that will focus on training new workers on ZEV technologies.

We have benefitted from partnership with California's Employment Training Panel, and multiple programs with California's community colleges.

Our programs manufacture investments totaling nearly $50 million as of our recent Business Meeting, are helping reduce the costs associated ZEVs and ZEV infrastructure, as well as providing in-state economic development.

We have also heard multiple speakers today speak to the value of the over $10 million we have invested in regional readiness planning, which supports planning efforts that prepare for and expedite the deployment of alternative fuel infrastructure and vehicles.

The Energy Commission partnered with the

National Renewable Energy Laboratory to develop quantifiable estimates of petroleum use reduction, air quality benefits, and greenhouse emission reduction associated with the Clean Transportation Program projects.

To estimate the benefits from the Clean Transportation Program projects two methods were applied, expected benefits and market transformation benefits.

Our next speaker, Chris Neuman from NREL, will walk us through this analysis.

Energy Commission staff provided NREL a list of pending, active and completed Clean Transportation Program projects, along with relevant information about each, such as project type, carbon intensity, displaced vehicle type, and et cetera.

As we transition to quantifying some of these benefits, I want to reiterate a previous point that our program does not operate in a vacuum. Our program supports and in turn is supported by numerous other State programs and regulatory mechanisms, including but not limited to the Low Carbon Fuel Standard, the State's Cap-and-Trade program, and the ZEV regulation.

In addition to these, funding partners have contributed over $860 million in match funding to our

projects across all fuel and technology types.

In short, when it comes to attribution of benefits, we recognize that our funded projects and their benefits also reflect involvement of those other investments and regulatory activities. Thank you.

MR. NEUMAN: Hello, my name is Christopher Neuman. Better?

Hi, my name is Christopher Neuman and I'm here from the National Renewable Energy Laboratory. And today, I will be talking to you about the ARFVTP Benefits and Market Transformation Update.

While I, alone, am presenting there have been numerous other people working through this update, including Chad Hunter, Maggie Mann, and Dana Stride. Unfortunately, due to conflicts, I am the only person present today. And while my area is market transformation section if there are any questions, I will answer them as best I can.

So, here is a brief overview and introduction. NREL was contracted in 2012 to assess annual benefits of the ARFVTP for the California Energy Commission. This includes two main areas that are known as benefits and market transformation.

Benefits are centered around the modeling of GHG emissions, petroleum reductions, and other pollutants

such as NOx and particulate matter.

The market transformation also uses the same metrics, but it focused on the benefits of increased infrastructure, industry advancement, and building upon success. Market transformation describes how funding at initial stages can get the ball rolling for improvements in renewable technology adoption.

Everything that I will cover in this presentation is a direct result of the Energy Commission funding under the ARFVTP.

So, let's start with a little bit of a background on the projects which NREL has modeled for the Energy Commission. These include fueling infrastructure, EVSEs, also known as plug-in electric vehicle chargers, and non-EVSE, all non-electric fueling.

The vehicle projects section ranges from the fully electrified light-duty vehicles to the process of the vehicle building itself.

Fuel production includes three classes of renewable fuels. Each recipient of funding fits within one of these classifications for benefits evaluation.

So, with the intro out of the way, let's get into the expected benefits preliminary results. So, in these charts, the bars show the annual reduction and the

shaded areas show the cumulative benefits. So, each bar shows what has been achieved for that year and the shaded area is that year and all years before it added together.

Through the combination of fueling infrastructure, vehicles and fuel production, a cumulative total of 3.5 billion gallons of petroleum will be reduced by 2030, and 19 million tons of CO2 by that same year.

So, this slide shows aggregate information on approved funding. As you can see from the bottom graph, vehicles account for the most investment, followed by fueling infrastructure and, lastly, fuel production.

In the fueling infrastructure category, hydrogen makes up the highest amount of dollars invested, while electric chargers account for the most agreements. In vehicle agreements, the medium-duty and heavy-duty truck demonstrations make up the highest investment dollars. And for fuel production, biomethane has garnered the most investment.

The total amount of all agreement funding comes to $670.5 million.

In this slide, the top plot shows the breakdown of key metrics of petroleum production and GHG reduction as a function of project subclass. The subclass and all

source data are provided to NREL by the Energy Commission.

For example, in this plot the GHG reductions for fueling infrastructure are largely driven by hydrogen, and natural, and renewable gas. Manufacturing is the largest contributor to reductions in the vehicle area. And overall, diesel substitutes are the most important for fuel production.

And this slide displays a tabular version of the previous plots and some of them may have been a little difficult to read. I'd like to draw your attention to the lower right-hand corner, where you can see a drop off by 2030 in gasoline substitutes, which you could see in the previous slide. The reason for this drop off is the annual benefits -- these are annual benefits and there are seven agreements that have a life end date of 2030, but two occur before 2029. So, you can kind of see a drop off as a result of some reaching the conclusion of their active life before the end of the observation period. This explains the reduction in some subclasses in future years, since the subclass has agreements ending before the 2030 date.

So, the previous slides conclude the update on the benefits preliminary analysis and from here we move on to the market transformation preliminary analysis.

So, in the previous incarnations of market transformation modeling, the exact coordinates of infrastructure were not always known. As of this update, we have an improved GIS methodology. This includes the improved fidelity through repeatability by use of latitude and longitude. Urban areas were grouped, in this case, by a metro area from a county perspective. And addition of state highways to better understand connections between metro areas. And removal of the concept of generalized charger locations, since before we kind of had to partition them based on proportions of populations in metro areas. Now, with the exact locations, we can get a better aggregation of those locations.

So, this table shows the increase in EVSE by urban area for Level 2 and DC fast chargers. So, gas stations are also shown here, as much of the analysis uses the comparison of advanced fuels to conventional fueling infrastructure.

As you can see from the table, Los Angeles shows the greatest increase for both Level 2 and DC fast chargers as a result of funding. All increases in EVSE shown are a direct result of Energy Commission funding. So, we are not picking pieces of any privately developed EVSE here.

So, this slide briefly explains perceived benefit limits, which I kind of wanted to point out. Perceived benefits can be thought of as how many chargers are there compared to gas stations, and how much utility of those locations brings down the cost in the consumer' mind?

For example, by this plot, if there are chargers everywhere, the purchase price of a PHEV seems $1,000 less. And you can see the same thing for battery electric vehicles, but there is a lower limit. This seemingly counter intuitive number seems to account for range anxiety, where PEV owners might forego a trip based on concerns of range.

So, when we look at these perceived benefits, the -- overall, in the State of California, the effect of more PEV charger locations reduced the perceived cost by $268 per plug-in hybrid electric vehicle and $176 per battery electric vehicle. The effect was more apparent in San Diego, where plug-in saw an overall perceived cost drop of $371 per vehicle. And this also partially due to the ratio of EVSE to conventional fueling stations in that urban area.

So, this is a quick chart that kind of shows the annualization of expected high and low for vehicles sold directly due to the impact of lower perceived costs.

And you can see if you sum up all the years, to 2022, you get an increase of 45,000 vehicles sold directly from just the better utility of EVSE charging infrastructure.

So, there is a similar methodology to the EVSE for HRS, or the hydrogen refueling stations. But after conversations with the Energy Commission staff recently, there may be new and better reporting methodologies, such as informed by things such as the coverage map shown here. And this is credit to a paper sent to us by the Energy Commission.

Older methodologies used penalty for hydrogen, where you essentially had a penalty for lack of infrastructure. But after conversations, that methodology might be more outdated, so we are going to be revisiting this quite soon.

New fueling projects. So, renewable fuels have increased since last reporting, with biomethane having the largest change. So, six new biomethane projects, which accounts for a 50-percent increase in expected output and a 30-percent increase in total funding since last reporting. Two new biodiesel account for a 3-percent increase in output and a 6-percent increase in total funding.

Oh, I'm sorry. So, yeah, catch up to that.

And the last point, so two new ethanol projects were proposed, and the addition of these projects marks a 15-percent increase in expected output and a 31-percent increase in total funding. So, a lot of activity in the fuels area since last reporting.

So, here are the market transformation benefits expected going forward, with the top band on these ribbon charts being the high end and the low band, obviously, being the low. You can see over time how each fuel contributes to greenhouse gas reduction and petroleum reductions.

So, for the New Fuels Project, you have 50-percent increase in biomethanes, GHG reduction, so all of these are in a positive reduction. Just the wording, itself, is a little counter intuitive. A 7.3 percent increase in biodiesel greenhouse gas reduction, and 8.4 for ethanol.

From a petroleum reduction perspective, you see much more gains from the gasoline substitutes overall. And that's around a 28-percent increase in biomethane. Petroleum reductions, 1.4 increase in biodiesel petroleum reductions and 2.8 percent increase in ethanol petroleum reductions.

So, this is an overall summary of the market transformational benefits. So, it might be a little

difficult to read, but there are five different categories of vehicle price reduction, ZEV industry experience, next-generation trucks and next-generation fuels. So, overall, you get the total high and low projections due to the market transformation effect on the lower graph. And you can kind of see how those grow over time. And that's an annualized version, not cumulative.

So, we have the same plots for the petroleum reduction. And these were the two main metrics that we were targeting for the, I guess the outputs for measuring the effectiveness.

So, with that out of the way, I wanted to look under the hood just a little bit and discuss some of the raw data that is provided to NREL by the Commission, and how it is handled.

So, quickly, and Susan kind of showed a little bit of this, too, this slide shows the various different types of data that we receive and their grouping. This data and their disposition are very important in that they enable us to more accurately predict the benefits as a function of funding.

Fuel production is calculated by using energy of a known displaced fuel and expected through put.

For vehicle section, we are supplied with the

replaced vehicle, the fuel type, and the number of vehicles.

EVSEs, we are given information about the charge points, their geo location as to better model their local effects.

And, finally, non-EVSE types, such as hydrogen, all this data is combined to allow us to model benefits provided in our final report.

So, there's been some interest in this in the past, so I just kind of wanted to go over just expected dispenses electricity methodology. There's the tool EVI-Pro. And for EVSE through put, we start with the target adoption rate, merge that with driving habits, and then calculate the utilization by through put and type. VMT is then calculated by combining this information with efficiency.

So, this kind of nears the end of what I was going to go through here. There is some backup, which is mostly just equations, calculations, so people can peruse at their own leisure.

This concludes the preliminary reports. This was obviously just a summary of the 150-page full report that is going to be coming out in the next couple months. All right, thank you.

(Applause)

MR. RILLERA: Great. I'd like to thank you for both of these presentations. And now, back to me.

We are now going to open the public comment period. And what we'll do is we'll start with folks in the room. If you have some comments, please come to the podium up here and identify yourself, and your affiliation. And we'll allow three minutes, three minutes per commenter.

And then we'll go, of course, to online afterwards. So, please.

MS. GARCIA: Hi, my name is Kathryn Garcia.

MR. RILLERA: Could you speak up a little bit louder?

MS. GARCIA: My name's Kathryn Garcia. I'm with Sierra Club California as a Policy Advocate. And we have the --

(Moves to microphone)

MS. GARCIA: Hi, my name is Kathryn Garcia and I'm a Policy Advocate at Sierra Club California.

That chapter is the legislative and regulatory arm of the Sierra Club and we represent 400,000 members and supporters statewide.

Thank you to the CEC for hosting this workshop today and for convening the speakers.

I just wanted to lay out some figures for the

acceleration of electric vehicles over the last eight years. Just as a starting point, in 2011 there were four EV models, and about less than 2,000 electric vehicles had been sold in California.

Conversely today, eight years later in 2019, there are 46 models and over 600,000 have been sold here in California. This is exponential growth and it wouldn't have been possible without the State's tremendous investments.

I'm glad to hear about the successful programs that were highlighted today. For example, the West Coast Electric Highway and other corridors, the Port Community EV Blueprint, led by the Port of Long Beach, and the electric school buses and other fleets that have been deployed here in the State.

These examples of zero emission technology and infrastructure are improving air quality across California and reducing greenhouse gas emissions to mitigate climate change.

Conversely, the use of biofuels is concerning because they are generally not emissions free and their use in combustion engines continue to contribute to climate and localized air pollution. These stop gap measures are detrimental to our communities.

Earlier today, we heard about the students that

were riding in electric school buses. I loved that story. And to them, zero emission vehicles are not in the distant future. Zero emission vehicles have arrived.

We urge the CEC to continue accelerating the adoption of zero emission vehicles, which is paramount to meeting our air quality and climate goals. Thank you.

MR. RILLERA: Great, thank you.

Any other comments in the room? Okay, let's go online. Jonathan?

MR. JONATHAN: Yes, can you all hear me?

MR. RILLERA: Yes. Please, go ahead. Thank you.

JONATHAN: Excellent, yeah. Hi, my name is Jonathan and I'm with Stratos Fuel. I just want to first thank the CEC for, I guess, putting this workshop together today. It's been very informative and great to hear all of the positive projects that have been going on that the CEC has funded.

So, that being said, I'm here to kind of encourage the CEC to continue funding of hydrogen fueling stations. Stratos Fuel is the recipient of two grants. One is for 100 percent renewable hydrogen production through electrolysis. The second is through

shared mobility using fuel cell vehicles.

Our renewable hydrogen production project is being built out over three phases. We would like to see the third phase come online soon, and which would allow us to reach economy of scale and reach a cost parity close to gasoline.

Secondly, we'd like to also see increased funding towards shared mobility. This allows us to have an opportunity to deploy more fuel cell vehicles in disadvantaged communities and to also grow demand at existing hydrogen fueling stations. So, thank you.

MR. RILLERA: Okay, thank you, Jonathan.

We will now open up all of the lines, if you have interest online in providing some comments. Any comments online?

Okay, I think we'll go ahead and close the public comment. Oh, excuse me, we have one more in the room. Please, Hannah.

MS. GOLDSMITH: Hi, Hannah Goldsmith with the California Electric Transportation Coalition, again. Thanks for letting me go late.

I also want to thank staff and echo a lot of what Kathryn from the Sierra Club said in terms of really understanding the role of the different technologies and where the Energy Commission is with

this program and funding those technologies. We're seeing a lot of movement coming from the Legislature and the Administration in terms of outlining where the State is going on zero emission vehicles, and a lot of regulations. And also, mandating electric vehicles, like with transit agencies, and airport shuttle fleets. And coming down the pike for medium- and heavy-duty manufacturers and fleets more broadly.

And funding programs are going to be absolutely essential to having a successful transition to zero emission vehicles. And it does seem like there needs to be a more coordinated response between State agencies to determine what the funding levels are and how appropriate they are to advancing zero emission vehicles. And what the role is, also, for near-zero emission in that transition.

We, at Cal-ETC have had a lot of internal discussions about avoiding the rollout of near-zero in application where zero emission technologies are here, and are ready, so that we're not, you know, transitioning from diesel or petroleum fuels to natural gas or renewable natural gas, only to then be mandated by the State to transition to zero emission fuels. It seems like a wasteful investment in that circumstance.

So, I think it will be very important to ensure

that the investments that we're making are also complementing the State's direction in that way. Thank you.

MR. RILLERA: Great. Thank you, Hannah.

All right, I have a brief closing comment, an observation on the day, if you will, that sort of frames the beginning of the Clean Transportation Program and where we are at today, in 2019.

The original establishing legislation occurred in 2007. And in 2008, we had a 75-year economic event that turned the world on its head. In particular, the United States, and California as at that time it was not the fifth largest economy.

There is something to be said about the development, in this economic condition, for an emerging technology program with which the Energy Commission was tasked back in 2007.

Some of the comments from the panelists today, with respect to those earlier projects were at that time, was one of the key words, without CEC support, sort of cling to this notion that there was very little capital, there was very little support, very little recognition of the technologies you heard today.

Fast forward 2019. We are in a pumping economy where unemployment is 5 percent or less. We are the

fifth largest economy in California.

And what did we hear today? We heard that the lessons learned from these funded projects are now our core business strategies. We heard unprecedented speed and scale. We heard exit strategies. We heard significant ROI, return on investments, while achieving return on equity. We heard quadrupling down on private investments.

These are the initial guideposts and the current guideposts for our investments for the Clean Transportation Program. So, I wanted to leave this with you as sort of final thoughts.

So, with respect to the next steps, identified here is the docket in which you can provide your formal written comments, and a link to that place to submit those, the docketed information.

We have identified August 1st as the deadline in which to submit these comments. You are more than welcome to submit them on behalf of your organizations, and your entities, and your affiliation.

You are also welcome to look at the questions through the lens of your organization and provide that to the docket, as well.

With that, I wanted to thank all the panelists that participated and you, in the audience, that were

with us for the full day and the discussion. Thank you.

(Applause)

(Thereupon, the Workshop was adjourned at 4:03 p.m.)

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REPORTER'S CERTIFICATE

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

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

IN WITNESS WHEREOF, I have hereunto set my hand this 8th day of September, 2019.

_____

Eduwiges Lastra
CER-915

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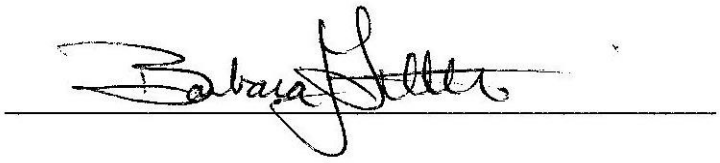

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