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STATE of CALIFORNIA

NATURAL RESOURCES AGENCY

CALIFORNIA ENERGY COMMISSION

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Transcript of the

IEPR COMMISSIONER WORKSHOP

on BENEFITS from the CLEAN TRANSPORTATION PROGRAM

Friday, July 30, 2021

held remotely by the

California Energy Commission
Warren-Alquist State Energy Building
1516 Ninth Street
Sacramento, California 95814

In accordance with Executive Order N-08-21, the Workshop was held via the Zoom video/audio internet and teleconference platforms.

Reported by:
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APPEARANCES

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Jonathan Bobadilla, Lead Staff for Manufacturing
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Present from the National Renewable Energy Laboratory (NREL):

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Madeline Gilleran
Chad Hunter
Christopher Neuman

Presenters:

Carmelita Miller, The Greenlining Institute
Stephanie Chen, MCE
Abigail Solis, Self-Help Enterprises
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Public Comment:

Jennifer Lu, SoCalGas
Robert Perry, Synergistic Solutions
Mikhael Skvarla, the Gualco Group, Inc., on behalf of the California Hydrogen Commission

I N D E X

P R O C E E D I N G S

July 30, 2021 9:30 o'clock a.m.

MS. RAITT: Everybody, welcome to today's 2021 IEPR Commissioner Workshop, the benefits from the Clean Transportation Program. I'm Heather Raitt, the Program Manager for the Integrated Energy Policy Report, which we refer to as the IEPR.

This workshop is being held remotely, consistent with Executive Order N-08-21, to continue to help California respond to, recover from, and mitigate the impacts of the Covid-19 Pandemic. The public can participate in the workshop consistent with the direction in the executive order.

To follow along, the schedule and slide decks have been docketed and are posted on the CEC's website. All IEPR workshops are recorded and the recording will be linked to the CEC's website shortly following this workshop and a written transcript will be available in about a month.

Attendees have the opportunity to participate today in a few different ways. For those joining through this online Zoom platform, the Q&A feature is available for you to submit questions. You may also upload a question submitted by someone else. Click the thumb's up icon to upload. Questions with the most votes are moved

to the top of the queue. We will reserve a few minutes near the end of the morning to take questions but will likely not have time to address all the questions submitted.

Alternatively, attendees may make comments during the public comment period at the end of the morning. Please note that we will not be responding to questions during the public comment period. Written comments are also welcome and instructions for doing so are in the workshop notice. Written comments are due August -- I want to say -- 11th -- 13th. Excuse me. August 13th.

So that's it. So with that I will turn over to Commissioner Andrew McAllister for opening remarks.

Thank you, Commissioner.

COMMISSIONER MCALLISTER: Well, thank you, Heather.

So my name's Andrew McAllister. I'm a commissioner overseeing this year's Integrated Energy Policy Report. And I just want to welcome everyone here. Thanks for all the attendees and, in advance, for all the presenters both in our staff and everyone throughout the day. I guess so we'll have mostly staff in the morning and then -- and then moving -- or first and then moving onto the presentation by NREL.

So I think rather than do any setup, I think I'll just say this is within the trajectory of this year's IEPR, obviously. Transportation is a massive piece of what we do here at the Energy Commission. And we are very lucky to be joined by the lead commissioner on transportation, Commissioner Patty Monahan.

And I will just pass the mic off to you, Commissioner Monahan, so thanks.

COMMISSIONER MONAHAN: Thanks, Commissioner McAllister.

So welcome, everybody. And I'm excited to have this conversation. This is a chance for us to review the impacts of the investments that we've been making to accelerate clean transportation in California. And this program has been around a long time, I think 2008 was the first legislation for this program. And in the beginning, you know, we were very focused on a diversity of fuels and what we have seen over time is that zero emission transportation has become -- you know, there is a greater and greater opportunity to accelerate not just near zero but zero emission in transportation.

Some of the impacts of our investments can be really hard to measure. And one of the examples of that is our investment in zero-emission vehicle refueling infrastructure. It's really hard to measure what the

concrete greenhouse gas impact is of putting, you know, an electric vehicle charger or a hydrogen-refueling station in a community. Yet we know that's a major barrier to deployment. And so the analytical team has been wrestling with these very challenging questions around, well, how do we measure impact and benefit with investments that we know are important but are hard to evaluate in greenhouse gas reduction terms.

So this -- you know it helps us refine our investments and improve our impact, and just really appreciate the analytical team that's been working on this and look forward to today's conversation.

COMMISSIONER MCALLISTER: Great. So let's pass it back to Heather to get started. I think -- well, Commissioner Gunda actually sends his regrets. He is working -- he is the lead commissioner on reliability. And with the constant heatwaves and challenges out there in the grid, he's rightfully focused on that and so likely will not be joining us today. So with that we'll say thanks to Commissioner Monahan and we'll pass it back to Heather for the series of staff presentations.

MS. RAITT: Great. Thank you, Commissioner.

Yeah. So we have a phase of commission -- oh, excuse me -- Energy Commission staff presentations, staff from the Fuels and Transportation Division. And the first

presenter is Susan Ejlalmaneshan. And she is the Program Manager for the Benefits Report. Following that, following her is Thanh Lopez from the EV Charging Team, and then Jane Berner from the Hydrogen Team, Marc Perry from the Freight and Transit Team, Hieu Nguyen from the Advanced Fuel Production Team, Jonathan Bobadilla who is the Lead Staff for Manufacturing, and Larry Rillera who is the Lead Staffer on Workshop Training and Equity.

So we'll just go through the presentations in order and then we'll take questions from the dias and then any questions -- a little time for questions from the participants using Zoom.

So with that, go ahead, Susan.

MS. EJLALMANESHAN: All right. Good morning, everyone. I am Susan Ejlalmaneshan with the Fuels and Transportation Division. Today I will be providing a brief overview of Clean Transportation Program along with some background information on Benefits Report requirements and codes. but before that let's have a quick review of the structure of today's workshop. Next slide, please.

I will provide an overview of the Clean Transportation Program of course. Other CEC staff will present on various funding categories, including light duty EV charging infrastructure, public hydrogen-refueling

stations, freight and transit, fuel production, manufacturing, and, finally, workforce training and development.

Then National Renewable Energy Laboratory analysts are going to provide their presentation on quantifying benefits. Next slide.

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 State policy, the state transportation sector will need to transition to low and zero carbon fuels and technologies. Next slide.

This slide captures some of the key policies guiding our implementation of the Clean Transportation Program. Our statute calls on us to provide preference to projects that maximize these and other goals. They include a variety of legislation, regulations, and government executive orders, all of which work in tandem to establish goals to achieve lower harmful emissions, better air quality, and carbon neutrality. Next slide, please.

The Clean Transportation Program originated from Assembly Bill 118 in 2007 and provides up to $100 million per fiscal year to help address the State's climate change

policies. The primary charge of the program, as capture 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.

Further, stated in the statute, the Commission shall provide preferences to those projects that maximize the goals of the program. Some examples include the project's ability to provide a measurable transition to a diverse portfolio of viable alternative fuels that meet petroleum reduction and alternative fuel goals: The project's consistency with existing and future State climate change policy and low carbon fuel standard, the project's ability to reduce criteria air pollutants and air toxics, and more. Next slide, please.

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 regulations, low carbon fuel standard, cap and trade/greenhouse gas reduction fund, utility investments, settlement agreements, air quality improvement program, Carl Moyer Program, utility investments into charging infrastructure,

and legal settlements that support ZEVs and ZEV infrastructure. Next slide, please.

Fiscal year 2021-2022 is the thirteenth year of the Clean Transportation Program. This table shows a very simple summary of where nearly $1 billion in program funding has gone through March 2021. The program has a broad portfolio of project types and fuel and technology types, as shown. Everything from low carbon biofuel production facilities to plug-in electric vehicle chargers to natural gas vehicles, to hydrogen-refueling stations. Next one, please.

Our statute requires the Energy Commission to include an evaluation of the Clean Transportation Program's efforts as part of each biennial Integrated Energy Policy Report, or IEPR. The last version was included in the 2019 IEPR. This evaluation includes the list of funded projects, the expected benefits from the funded projects, the overall contribution toward a transition to clean, alternative transportation fuels, the identification of obstacles and challenges of access, to clean alternative transportation fuels and, finally, recommendations for reaching the State's goal. Next slide, please.

The CEC seeks to increase the participation of disadvantaged and underrepresented communities from a

diverse range of geographical regions. The CEC also seeks to effectively engage communities disproportionately burdened by pollution and improve economic resiliency, including rural and tribal communities.

Today we have accomplished the following: Diverse the Clean Transportation Program Advisory Committee to better reflect California communities and provide increased representation of program beneficiaries, environmental justice communities, rural communities, tribes, and others. Consulting the Disadvantaged Community Advisory Group for guidance and recommendations on program effectiveness as it relates to disadvantaged communities and other vulnerable and underrepresented groups. Consulting with the CEC's Tribal Program and the Tribal Lead Commissioner for assistance with outreach and promotion of transportation and related funding opportunities to tribes.

Assessing distribution and access of EV charging infrastructure under SB 1000. Results show that public chargers are located with EVs but unevenly distributed by income, population density, and geography. Low-income communities have the fewest chargers per capita and the widest range of drive times to chargers, up to over three hours to a DC fast charger, compared to medium- and high-income communities. Analysis is ongoing and results will

help inform equitable EV infrastructure deployment under the Clean Transportation Program. Next slide.

Out of nearly $1 billion in Clean Transportation Program funding spent so far; $484.7 million, or 49 percent, has been spent within disadvantaged community, low-income community or both. That percentage increases to 69 percent if you remove statewide level projects from the equation. The data used to help determine the location of these investments is based on the use of the CalEnviroScreen Tool. In one of the most recent investment plans for the program, the plan articulated a minimum investment of 50 percent of program funds are to go to priority communities. As a result of this intentionality, these communities can accrue immediate environmental and economic benefits of the project's work. Next slide, please.

Program and staff have begun looking at ways to better define benefits to disadvantaged communities other than location-based project results. This work is looking at ways to better capture actual benefits to disadvantaged and low-income communities. The goal is to develop program-wide best practices and develop metrics for better tracking and reporting of benefits. For transparency, the team will follow a public process, including holding a workshop to solicit input and feedback, engagement with

various stakeholders, and plan to begin implementation in early '22. Next slide.

This concludes my presentation, and now I'm handing it over to Ms. Thanh Lopez. Thank you for your consideration.

MS. LOPEZ: Good morning. I'm Thanh Lopez, staff in the EV Charging Infrastructure Unit within the Fuels and Transportation Division. I will be providing an overview of: Light-duty electric vehicle charger investments, program successes, and near-term funding plans for light-duty electric vehicle charging. Next slide, please.

I'd like to start with a history of electric vehicle charger investment. In 2010, the Energy Commission partnered with the federal government to frontload plug-in electric vehicle infrastructure, which included the EV Project, a large-scale plug-in electric vehicle infrastructure demonstration funded by the U.S. Department of Energy.

In 2012, the Commission focused on regional planning to prepare regions in California for the mass deployment of plug-in electric vehicles. The CEC continues to provide support for the installation of charging infrastructure and focus on the upgrade or retrofit of legacy chargers to the SAEJ1772 standard we

use today.

In 2014, the focus was on increasing the number of available public and shared private charger infrastructure to meet specific needs, such as charging at public destinations, workplaces, fleet, and at multi-family housing. In 2015, the CEC focused on the deployment of DC fast chargers along highway corridors to facilitate interregional travel within California as well as to and from Nevada, Arizona, and Oregon. Next slide, please.

In order to target funding to move the needle to reach California's EV infrastructure target, the Commission needed a mechanism to install EV charging infrastructure much more quickly and effectively. In 2017, the CEC awarded an agreement with the Center for Sustainable Energy to launch our first block grant project, CALeVIP, the California Electric Vehicle Infrastructure Project, which provides targeted regional streamlined rebated incentives for charger deployment.

In 2018, the CEC funded EV Ready Communities Blueprints for communities to identify actions needed to accelerate the implementation of electrified transportation at the regional level. This was a two-phase effort. In 2020, Phase II funded the implementation of those projects identified in Phase I.

Recognizing that there is not a one size-fits-all solution to charging needs, in 2020 the CEC released a solicitation to demonstrate innovative electric vehicle charging solutions for light, medium, and heavy-duty vehicles, and worked to accelerate the successful, commercial deployment of those solutions.

To present day 2021, the CEC is in the process of selecting block grant implementors to continue to provide incentives for electric vehicle charger deployment. The CEC is also funding vehicle grid innovation labs to increase capacity and through-put of electric vehicle charger standards testing at laboratories. The intent is to provide a timely and cost-effective avenue for stakeholders to validate and test products for conformance to established standards. And later this year, the CEC anticipates solicitations targeting light-duty transportation services, multi-family housing, and rural areas of the state. Next slide, please.

The CEC has supported a rollout of light-duty plug-in electric vehicles by awarding more than $188 million in Clean Transportation Program funding for electric vehicle chargers. This includes a variety of technologies, such as Level 1, Level 2, and DC fast charging, with different access levels, such as private,

shared-private access, and public access.

The CEC has funded chargers at a variety of locations, including nearly 4,000 private residential chargers at the beginning of the program, over 9,000 shared-private and public-access chargers located at workplaces, fleets, highway corridors, and public destinations. I will note that this does not include Charger 3, a project that has not been approved at a CEC business meeting and a project that has not yet been reserved under a CALeVIP project, so meaning the rebate has not been reserved under an active CALeVIP project or a future-planned project that has yet to be approved. Next slide, please.

So funding from the CEC's Clean Transportation Program has helped contribute to California's network of shared, private and public chargers. The CEC's efforts, starting in 2015, helps build out a network of DC fast chargers along highway corridors in California, including nearing completion of its portion of the West Coast electric highway.

This DC fast charger network will also help increase range confidence to allow electric vehicle drivers to travel longer distances across the state and enabling interregional travel.

Funding of EV community blueprints have helped

nine different communities identify actions and milestones needed to become an electric vehicle ready community. The effort encouraged collaboration from community leaders, local government, technology developers, utilities, researchers, and other project partners to help develop these replicable blueprints.

And, finally, the CEC's CALeVIP Block Grant Project provides incentives for the purchase and installation of electric vehicle charging infrastructure in targeted regions throughout the state. The funding is targeted at regions that have low rates of infrastructure installation or lack adequate incentives from utilities and other sources. To date, CALeVIP has launched 10 regional incentive projects, covering 32 counties in the state. Next slide, please.

The CEC has made various investments in projects that provide benefits to low-income and disadvantaged communities. The CEC has funded innovative e-mobility projects, such as electric vehicle sharing, ridesharing, and alternate transit services to promote innovative mobility service demonstrations in disadvantaged communities. These projects have broadened the market of plug-in electric vehicle purchases, such as for those that may not have dedicated parking space for charging at home. Projects, including demonstrating an all-battery electric

vehicle car-sharing program and multi-family housing locations, which include affordable housing developments and housing within disadvantaged communities.

Another project demonstrated a ridesharing program with Chevrolet Volts for students attending Fresno City College from rural areas of Fresno County.

The Clean Mobility Options Program is a first come/first served voucher program that focuses on disadvantaged, low-income, and California Native Tribal communities. The program provides vouchers to fund Clean Transportation Projects, such is that zero-emission vehicles, charging infrastructure, and site improvements. The CEC is partnering with the California Air Resources Board to expand the program eligibility and funding. The funding from the CEC will offer additional vouchers, technical assistance, and outreach to communities.

And, finally, CALeVIP offers dedicated funding amounts for higher incentive amounts for projects in disadvantaged communities and/or low-income communities. On the graphic to the right, you will see 49 percent of rebates for Level 2 installations and 42 percent of DC fast charger installations went to disadvantaged communities. Next slide, please.

As a demonstration of the Energy Commission's effort to provide benefits to low-income and disadvantaged

communities, we most recently launched Inland Counties Incentive Project under CALeVIP, that focuses on deploying EV charging in 13 rural counties across the state. A minimum of 35 percent of funding will be invested in disadvantaged and/or low-income communities in all counties and a minimum of 25 percent will be reserved for installations in unincorporated communities for specific camping. Next slide, please.

The recently-published Assembly Bill 2127, Electric Vehicle Charging Infrastructure Assessment Report, shows the state will need nearly 1.2 million public and shared-private chargers by 2030 to meet the demands of eight million light-duty zero-emission vehicles. The state currently has over 70,000 operational chargers with an additional 123,000 planned by 2025. This means the state may fall short by about 57,000 chargers. The CEC will continue to provide funding through the second block grant, solicitations, and our other funding methods to help build this near-term infrastructure gap, as well as continue to focus on providing benefits for low-income and disadvantaged communities.

While there is a need to fill the infrastructure gap, the CEC will also continue to look at charging innovations that fit unique settings or better serve harder-to-reach market segments, such as multi-family

housing, also innovations that serve different business models or technologies that may not comport with existing program requirements. For future solicitations for electric vehicle charging, the CEC plans to target multi-family housing residents and increase charging access in rural communities.

This concludes my presentation. I will pass it off to my colleague Jane Berner, who will present on hydrogen-refueling stations.

MS. BERNER: Great. Thank you, Thanh.

All right. As Thanh said, I'm Jane Berner from the Hydrogen Refueling Infrastructure Unit. I will be providing a brief overview of the Clean Transportation Program support of hydrogen-refueling stations for fuel cell electric vehicles. Next slide, please.

Assembly Bill 8 of 2013 established the goal of achieving at least 100 publicly-available hydrogen stations in California and stipulated that $20 million be allocated annually from the Clean Transportation Program to support the development of these stations.

Hydrogen stations provide fuel for fuel cell passenger cars, like the Toyota Mirai and the Hyundai Nexo that are currently available in California. A picture of one of the most recently-opened stations is on this slide, so you have an idea of what they're looking like these

days.

We have another goal of achieving 200 stations by 2025. That was established in an executive order from Governor Jerry Brown. Susan mentioned this executive order. And along with the charging stations that Thanh discussed, this infrastructure will support the goal of having five million zero-emission vehicles by 2030.

Governor Gavin Newsom also set additional goals for zero-emission vehicles in California, as Susan described in her presentation. And the two main zero-emission vehicle types, which are fuel cell electric vehicles and plug-in electric vehicles, and complement each other because each has advantages in particular customer needs cases. Fuel cell electric vehicles can offer advantages for those who drive long distances, have limited time to refuel, or carry a heavy load. Next slide, please.

To date, about $166 million in Clean Transportation Program funds have been allocated to public hydrogen-refueling infrastructure. This investment has been matched by $92 million in funding from station developers. By the end of the Clean Transportation Program, which is currently scheduled to end on January 1st, 2024, we except to have spent $252 million.

The future funding of $86 million is so good for

through the most-recent solicitation where we released -- called GFO-19-602, wherein we asked station developers to propose projects that would develop stations in batches over time as this funding becomes available. So we know that station developers are planning to match the future investment with $99 million of their own funding, for a total of $109 million in match funding for the overall station network. Next slide, please.

So how many stations do we have in the pipeline? So our total of 179 retail stations that we expect to open by the 2026 timeframe, 52 of which have already opened. Of the 179 stations, 156 will receive Clean Transportation Program funding. The private sector has announced plans to build 23 stations without public funding. And in fact two of these stations have already opened. We think that the station investment that the private sector is starting to make on their own is an indication of the success of the CEC's work and of the work done by our partner agencies, the California Air Resources Board.

While we at the CEC have worked to improve our grant solicitation process for station development, CARB has implemented the Low-Carbon Fuel Standard Hydrogen Refueling Infrastructure Program that provides station owners more certainty in their ability to generate LCFS credit. A main objective of both our efforts have been to

facilitate a self-sustaining market for station development.

So as you can see, the 179 planned stations fall short of reaching the 200-station goal established by Governor Brown, but we are looking to close this gap. We are also moving to fund infrastructure for medium- and heavy-duty fuel cell vehicles. And some of these planned public stations will be capable of also serving these larger vehicles. Additionally, we try to ensure stations are located in appropriate places, to provide the geographic coverage and fueling capacity needed to serve as many communities as possible, including disadvantaged communities. Eleven of the 52 open stations are located in disadvantaged communities. Next slide, please.

Perhaps more important than if a station is in a disadvantaged community is how well community residents can access the station. One way we evaluate access is by looking at the percentage of the population that can reach a station within a certain drive time. This drive time analysis is just one metric by which we can evaluate equity. And it is not to say that other metrics are not important. And Susan did a good job of describing in her presentation our overall larger effort to evaluate equity. But at least we know that by this one metric, the stations that we are supporting are of similar convenience in terms

of their locations to people living in disadvantaged communities as they are to the overall state population. Next slide, please.

We have been focusing on awarding funding in such a way that will enable station developers to achieve economies of scale and reduce the costs of station equipment and to also support a much larger fuel cell electric vehicle market so that we can meet our zero-emission vehicle goals.

As I already mentioned, our most recent solicitation, GFO-19-602, was structured to reserve the $20 million funding allocations of future years so station developers could plan future stations with confidence and achieve the scale needed to reduce the cost per station. We think we were pretty successful in achieving this and that the grant funding per station was lower in GFO-19-602 than it was in the previous solicitation. And at the same time stations are continuing to have more fueling capacity, to be able to serve more vehicles each day. This cost-in-capacity relationship is shown in the figure in the upper right on the slide.

And on this slide there are also some images that indicate the way the physical layout of stations have evolved. In early stations there was typically one dispenser that was often located on the edge of a gasoline

station property. In future stations, some will have their own fueling canopy, kind of in the center of the station, and most will have two to four fueling hoses to be able to fuel vehicles simultaneously. Next slide, please.

Now I want to turn to how much hydrogen we're talking about in terms of what is needed to support the transportation market. We have been tracking the amount of hydrogen fuel dispensed in the California station network since stations first began opening in 2015. We receive dispensing data from most stations, which is shown in the dark blue in this figure. And for stations for which we did not receive data, we estimate dispensing, which is shown in the lighter-blue pattern.

You can see that daily dispensing was nearing 4,000 kilograms per day at the end of 2019 and the beginning of 2020. To put this in perspective, passenger fuel cell electric vehicles have tank sizes of about five kilograms, and the average fill is a little bit over three kilograms. So this means that at the peak about a thousand fuel cell electric vehicles were filling on the system daily.

Covid-19 and lockdown orders led to a reduction in dispensing for much of 2020, but the most recent reports we have from station operators, not yet in this

figure, is that we understand daily dispensing is near prePandemic levels again.

I also want to mention the renewable-hydrogen requirements that exist for hydrogen. Senate Bill 1505 in 2006 set a requirement that 33.3 percent of hydrogen dispensed from stations supported by State funding be renewable. And the Low-Carbon Fuel Standard Hydrogen Refueling Infrastructure Program requires that participating station owners maintain 40-percent renewable hydrogen across our stations. Because most stations participate in the Hydrogen Refueling Infrastructure Program and the CEC matched this requirement in our last solicitation, 40 percent is pretty much now the de facto requirement that station owners need to meet. Next slide, please.

The fueling we see on the network today is from a population of about 10,000 passenger fuel cell electric vehicles in the state. When all of the planned 179 stations are open, we will have a network daily capacity of about 160,000 kilograms per day. This amount of hydrogen could support a population of about 230,000 fuel cell electric vehicles. So the station network we're building will be able to support many more fuel cell electric vehicles, which is important if we're going to be able to achieve that five million zero-emission vehicle

goal by 2030 and all new passenger car sales being zero emission by 2035. Next slide, please.

I'm concluding my presentation here and I am going to introduce my colleague Marc Perry who will talk about freight and transit investments. Next slide, please.

And take it away, Marc.

MR. PERRY: Thank you, Jane.

Good morning, everyone, Commissioner McAllister, Commissioner Monahan. My name is Marc Perry and I am a member of the Freight and Transit Unit of the Fuels and Transportation Division.

As we have heard before, California's economy if it were a sovereign nation would be fifth in the world, with a gross domestic product of more than $3 trillion. Freight and transit vehicles are essential to the domestic goods movement, mass transportation, and international trade. On-road freight transportation is the backbone of the California economy -- no, go back to the other one, please. Thank you. On-road freight transportation is the backbone of the California economy, moving about 3.8 million tons of goods up and down the state's highways daily. California transit systems are just as important to the economy as they provide a means for many to get to work. Next slide, please.

The trucks and buses, however, are some of the least fuel-efficient vehicles operating and are the worst polluters and emitters of greenhouse gases. Class 8 trucks, the big rigs hauling large trailers through city streets and along the state's highways, are arguably the most visible sign of a healthy economy. They have a vehicle fuel economy of not even six miles per gallon. And while the freight transportation sector makes up only a small percentage of total vehicles on the road, it has a huge air quality impact on communities living and working near heavily-trafficked roadways. This sector is responsible for 26 percent of all state greenhouse gas emissions, 80 percent of all oxides of nitrogen emissions in the state, and 90 percent of all diesel particulate matter.

The communities living near these roadways are often disadvantaged and have seen medical consequences as a result of this pollution, as increased instances of asthma, cancers, emergency room visits, and hospitalizations, to name a few. Next slide, please.

California has put in place regulations and executive orders to advance clean transportation and clean up the state's freight and transit sectors. The Innovative Clean Transit Regulation mandates that all buses will be zero emission by 2040. The Advanced Clean

Trucks Regulation states that by 2045, all new truck purchases will be zero emission. And Governor Newsom's Executive Order N-79-20 stipulates that all the medium- and heavy-duty trucks and buses will be zero emission where feasible by 2045.

The combination of regulations, executive orders, and legislation send a strong policy signal that California is moving in the direction of medium- and heavy-duty zero emissions. Next slide, please.

One of the earliest pieces of legislation aimed at curbing tailpipe emissions was Assembly Bill 118, which created the Clean Transportation Program, formerly known as the Alternative and Renewable Fuel and Vehicle Technology Program. Assembly Bill 8 subsequently extended the Clean Transportation Program to January 2024.

Since 2009, the Clean Transportation Program has invested more than $151 million in projects that build and repower trucks and buses to demonstrate the viability of near-zero and zero-emission medium- and heavy-duty vehicles and fueling infrastructure. Between 2014 and 2018, the Energy Commission released four solicitations for advanced freight vehicle and Infrastructure projects. These solicitations awarded more than $90 million to roughly 20 projects demonstrating advanced technology vehicles and infrastructure in the Ports of Los Angeles,

Long Beach, and San Diego. These projects would deploy several zero- and near-zero emission vehicles, including yard tractors, drayage trucks, gantry trains, pop handlers, and forklifts, as well as installing charging and fueling infrastructure for electric and hydrogen vehicles.

Prior to 2017, the Freight and Transit Unit was funding medium- and heavy-duty alternative fuel demonstrations and infrastructure projects, such as natural gas and battery-electric hybrids. As technologies advanced and policies were enacted, the Freight and Transit Unit shifted its focus to zero-emission vehicles and infrastructure, such as battery electric and hydrogen fuel cell. In 2017, after receiving input from stakeholders about the need to have chargers and hydrogen fuel stations funded by the program, the Freight and Transit Unit released two solicitations targeting infrastructure-only projects. Next slide, please.

From 2009 to 2021, the Freight and Transit Unit has progressed from funding demonstration projects and funding -- to funding pilot and deployment projects with commercially-available technologies. I'd like to highlight a few successful projects we've had. Next slide, please.

Transportation Power, Incorporated, or

TransPower, as it's more commonly known, -- sorry -- was awarded $3 million in 2014 to build five new battery-electric yard tractors and demonstrate them in various locations throughout the Central Valley. These five yard tractors were used in harsh environments and performed better than TransPower had anticipated, so much so that the vehicle manufacturer officially created a line of battery-electric yard tractors using TransPower's motor system that was eligible for incentive vouchers through the California Air Resources Board's Hybrid and Zero-Emission Truck and Bus Voucher Incentive Program -- Project, also known as HVIP. Next slide, please.

The Port of Long Beach was awarded $9.7 million in 2016 for its Zero Emissions Terminal Equipment Transitions Project, and it is currently demonstrating six battery-electric yard tractors and four rubber-tire gantry cranes that were converted from conventional diesel power to all electric. Despite challenges from the Covid-19 Pandemic, this project continues to progress. Next slide, please.

The City of Gardena's Zero-Emission Bus Repower Project was awarded $2.7 million in 2015 to convert four transit busses from gasoline-electric hybrids to fully zero-emission battery-electric buses. The Gardena Municipal Bus Lines demonstrated the buses on routes

through disadvantaged communities for 12 months. And their effectiveness was such that Gardena has continued to expand its zero-emission fleet.

Understanding the goals of California and seeing there is going to be a big push towards converting California's existing and medium- and heavy-duty fleets, the Clean Transportation Program proposed a long-term focus on zero-emission vehicle infrastructure for trucks and buses. Beginning in 2019, the Freight and Transit Unit began drafting ideas and soliciting stakeholder feedback into future funding projects.

In 2020, in the midst of the Covid-19 Pandemic, the Freight and Transit Unit, consisting of six staff and a supervisor, and in collaboration and partnership with EV Infrastructure in the Fuels and Transportation Division, and the CEC's Energy Research and Development Division, was able to develop and release six grant funding opportunities or GFOs, totaling over $100 million in funding for medium- and heavy-duty zero-emission vehicle fueling infrastructure.

In 2021 the team has been proposing awards and will be recommending approval of nearly 40 medium- and heavy-duty zero-emission planning and infrastructure projects at CEC business meetings. I'd like to highlight these recent funding opportunities and proposed awards.

Next slide, please.

First, GFO-20-601 proposed awards totaling nearly $5.6 million to 28 public agencies, private companies, and nonprofits to create planning blueprints that will identify the actions and milestones needed for the implementation of medium- and heavy-duty zero-emission vehicles and their related electric charging and/or hydrogen-fueling infrastructure. In order to accelerate the deployment of those vehicles and infrastructure with a holistic, futuristic, and replicable view of transportation planning. Next slide, please.

GFO-20-602 proposed $20 million in awards to Anaheim Transportation Network, the Los Angeles Department of Transportation, SunLine Transit, and North County Transit District for zero-emission fueling infrastructure needed to support the large-scale conversion of their diesel-transit fleet buses to battery electric or hydrogen fuel cell. Next slide, please.

GFO-20-603 awarded $17 million and up to $50 million in block grant funding to CALSTART to design and implement the nation's first incentive project for zero-emission truck and bus charging and fueling infrastructure called EnergIIZE Commercial Vehicles. For reference, EnergIIZE stands for Energy Infrastructure Incentives for Zero-Emission Commercial Vehicles. Next slide, please.

For GFO-20-604, we partnered with our Energy Research and Development Division to propose funding for the demonstration of hydrogen rail and marine applications to ports. We were able to propose $4 million in Clean Transportation Program funding to Shell Oil Products to develop the first multi-model hydrogen-refueling station in California. This hydrogen-refueling infrastructure will support a switcher locomotive awarded through the Research Division, in addition to on-road, heavy-duty hydrogen vehicles, which will reduce air pollution and greenhouse gas emissions. Next slide, please.

We partnered with our EV Infrastructure Unit for GFO-20-605, which proposed three awards for $4.1 million to Momentum Dynamics Corporation's WattEV and Electrify Incorporated to demonstrate innovative electric-vehicle charging solutions for medium- and heavy-duty vehicles to accelerate the successful commercial deployment of those charging solutions. Much to my chagrin, I just noticed this morning that Electrify is not on this slide. Electrify's project is the Sacramento Electric School Bus Vehicle to Grid Integration Project, and it was awarded more than $560,000. Next slide, please.

GFO-20-606 awarded $44.1 million to South Coast Air Quality Management District and The Center for the Transportation and the Environment as part of the first

ever collaborative-funding opportunity between the California Energy Commission and the California Air Resources Board to fund the large-scale deployment of zero-emission Class 8 drayage and regional-haul trucks, and the necessary zero-emission funding -- fueling infrastructure needed for service operation. Twenty-four million dollars was available from CARB for the purchase of the trucks and $20.1 million was available from the CEC for the purchase of charging and hydrogen-refueling infrastructure to support those trucks, in addition to workforce training and development. Next slide, please.

These are just some of the efforts the Freight and Transit Unit has been working on recently in relation to medium- and heavy-duty zero-emission infrastructure. Under our proposed Clean Transportation Program Investment Plan, we anticipated nearly $115 million in funding for medium- and heavy-duty zero-emission vehicle infrastructure over the next two and a half years. Earlier this month Governor Newsom approved the ZEV Infrastructure Package, which allocates over $1 billion to the Energy Commission to fund zero-emission infrastructure projects over the next three years, some of which will be solely for medium- and heavy-duty infrastructure projects.

I encourage you to sign up to our Energy Commission list servers if you are not already, so you can

be kept up to date with agency information, upcoming workshops, and are notified when new grant funding opportunities are released. That is all I have for my presentation. If you have any questions after the conclusion of this meeting, please feel free to send me an email.

Up next is Hieu Nguyen with the Fuel Production Unit. Thank you.

MR. NGUYEN: Thank you, Marc.

Hello. My name is Hieu Nguyen, staff from our Advanced Fuel Production Unit of the Fuels and Transportation Division. Our unit directly supports the Clean Transportation Program's Alternative Fuel Production and Supply Category.

I'm here today to provide a general summary of the Biofuel Production Project. Next slide, please.

To date we have funded over 70 Advanced Fuel Production Projects throughout the state, including a number of ethanol projects, renewable diesel, and biodiesel projects, and a number of biomethane production projects that have utilized different technologies. More recently, we have funded two renewable hydrogen production projects. This brings our total funds awarded in this category to a little over $200 million.

Program funds over this span have leveraged

about $392 million in match share. This is close to a two-to-one match share leverage ratio. Next slide, please.

How has our Alternative Fuel Production and Supply Program evolved over time. From the introduction of this program, we have supported all fuel categories: Gasoline substitutes, diesel substitutes, and biomethane in all production scales. We had learned over the years to specialize our funding to help support the industry's needs from initially supporting the production of non corn-based ethanol and E85 refueling infrastructure to now supporting the production of low-carbon intensity bio base drop-in fuels.

With our ongoing support for commercial-scale fuel-production projects, in the past we have supported the following production stages: Last-scale or early-stage projects that promote transformative technologies; demonstration/pilot-scale projects that utilize novel commercial scale technologies in a first-time public demonstration to prove out the technology; and commercial-scale projects, which are projects that utilize commercially-proven technologies that focus on using locally-available feedstock supply and working to improve overall efficiency of biofuel production through the continued evaluation of how local resources are impacted

by increased production.

Additionally, by promoting the use of California-based feedstocks, the Energy Commission's contributions to the biofuels market has and continues to support the efforts to utilize California-based feedstocks that help the market become self-sustaining.

Wasted-based feedstocks, such as municipal and dairy waste, have played a significant role in contributing to several of California's emission-reduction policies. One example of this can be the increased use of forest biomass as a feedstock. Due to forest-management practices and more recently a bark beetle infestation, we have been dealing with an abundance of woody biomass that increases fire risk throughout the state. While strategies for how to dispose of the excess woody biomass are still being discussed, using it as a feedstock for biofuel production is still being explored.

In our most recent grant funding opportunity, we are requiring prospective projects to produce fuel with a final carbon intensity score of equal or less than 30 grams of carbon dioxide equivalent per Megajoule. The hope is that the industry will be driven to provide a low or ultra low carbon alternatives for vehicle and transportation sectors that may be slow to switch to zero-emission vehicles. Based on data from the California Air

Resources Board Mobile Source Strategy Report, internal combustion vehicles will still consume about 1.2 billion gallons of liquid fuel in 2045, with the assumption that internal combustion engine vehicles will only represent a relatively small portion of the on-road fleet at this time, supporting the thought that there will be legacy fleets on the road for years to come. Sorry.

Lastly, we have recently expanded the program to include renewable hydrogen production and ultra low-carbon fuel blending, which I will talk more in a future slide. Next slide, please.

Moving forward, the Energy Commission's Clean Transportation Program is looking to evolve with the market as it provides funding in two new areas. Next slide, please.

The opportunities I wanted to highlight are two currently open solicitations for the total of $15 million for additional renewable hydrogen production and commercial-scale fuel production and fuel blending of renewable diesel and biodiesel. The first opportunity is GFO-20-609, the Renewable Hydrogen Transportation and Fuel Production Solicitation. The focus of this opportunity is to expand California's instate production of hydrogen as a transportation fuel by supporting projects that increased their production capacity by 1,000 kilograms a day of 100-

percent renewable hydrogen.

As the Energy Commission aims to increase focus on expansion -- on expansion on the use of hydrogen and increase hydrogen-infrastructure accessibility, increased in-state renewable fuel production will support expansion efforts which is especially important in the medium- and heavy-duty vehicle sectors. Next slide, please.

The second opportunity is GFO-29-608, the Ultra-Low-Carbon Fuel Commercial-Scale Production Facility and Blending Infrastructure Solicitation. This solicitation directly supports the expansion of in-state commercial-scale low-carbon fuel production. A portion of the available funding will support commercial-scale low-CARB and fuel blending, which provide critical infrastructure in the state with the distribution of a low-carbon renewable bio-based diesel fuel blend that we anticipate usage of this fuel would grow exponentially in the next few years.

Furthermore, we will continue to support increased in-state production of other low-carbon fuels that can contribute to the California climate change and emission-reduction goals. Additional funding will become available in the next few years and as well as evolving policies and programs will help provide guidance on where this fuel -- this funding should be directed in regards to

biofuels. Next slide, please.

So now I will provide an overview of projects that the Clean Transportation Program has funded over the years, to highlight the various opportunities and benefits associated with biofuel production in California. Next slide, please.

One of the program's first larger-scale projects was with CR&R. CR&R is a large waste and recycling firm serving 2.5 million customers and 40 municipalities in Southern California. Managing approximately 1.5 million tons of solid food waste -- waste per year, biodegradable materials that are separated from the balance of the waste stream are pumped into a two-stage anaerobic digestion system to produce a biogas that is then cleaned and injected into the natural gas pipeline. And it is also used to fuel waste management refuse trucks in the region.

This project is the first of its kind in California to successfully connect to and inject renewable natural gas that meets the pipeline quality standard into the natural gas pipeline network. Next slide, please.

Next we have the Rialto Bioenergy Facility project that is currently in the third phase of development. This project with energy -- energy initially consists of the revitalization of a closed facility. And over the past several years, they have started working on

the expansion. This new expansion will process up to, well, an additional 300 tons of food and organic waste sourced from the local community, and inject that renewable natural gas into the SoCal Utility pipeline for transportation use. Next slide, please.

Lastly, we have the Five Points Pipeline Project. Dairy manure that are left untreated are a major source of methane emissions in the Central Valley. This dairy farm cluster project proposes to reduce emissions from dairy farm operations to produce a very carbon-negative intensity fuel. The purpose of this project is to design, build, and commission a biogas-conditioning facility in Fresno County. The project will also collect biogas captured from surrounding local dairy digesters and transport the gas through a private, low-pressure pipeline to the gas-upgrading facility. The finished fuel will be then injected into the PG&E utility pipeline for transport to new and existing CNG stations in the Central Valley. Next slide.

This concludes my presentation. Now we turn the presentation over to my fellow colleague Jonathan Bobadilla, who will discuss about our manufacturing investments for the program.

MR. BOBADILLA: Thank you.

Good morning. My names Jonathan Bobadilla,

Energy Commission Specialist for the Fuels and Transportation Division. And I will be presenting on manufacturing investments made by the Clean Transportation Program. Next slide.

The California Energy Commission under the Clean Transportation Program has valued the development of advanced vehicle manufacturing and the emerging supply chain. Since the inception of the program, five manufacturing solicitations have been issued for a portfolio of 27 projects valued at over $55 million. Each of these solicitations had been over subscribed. Portfolio companies include Proterra, ChargePoint, Motiv, Zero Motorcycles, FreeWire Technologies, Cummins Electric, and more. Commercial products include vertically-integrated transit buses, electric vehicle supply apartment, electric motorcycles, power trains, battery-control systems, and services, to name a few. Next slide.

I'd like to highlight the incredible resilience these companies showed during the height of the Pandemic. When lockdowns were in effect and countless businesses started to close, our manufacturing partners were able to be designated as essential businesses and not only continue operating but doing so safely.

For 2020 and 2021, the CEC received no reports from any of our manufacturing partners that they had to

end operations due to the Pandemic. On the contrary, many of manufacturing partners continued to improve their capability and capacity by 20 to 100 percent in some of their key EVSE manufacturing areas, while adding new production lines here in California. Our manufacturing partners were able to continue deploying ZEV products to their customers, thus reducing supply chain shocks that we read about in so many other industries. Next slide.

Our manufacturing partners through factory layout changes and embracing telework where feasible were able to keep their California teams intact. ChargePoint, for example, was able to preserve over 40 California-based team members by making these kinds of changes. TransPower, through their acquisition by Maritor, Inc., was able to almost double the amount of full-time and temporary jobs at their manufacturing facility near San Diego during the term of our last manufacturing agreement.

Everyone from software design engineers to sheetmetal fabrication technicians were able to join in good-paying ZEV-related jobs. And in December of 2020, Proterra also opened a new battery-production line in the City of Industry, California. Once at capacity, this new manufacturing facility will create dozens of new jobs in Los Angeles County, including more than two dozen positions represented by the United States Steelworkers

Local 674. Next slide.

And as of June 2021, zero-emission vehicles were California's number one export, valued at $5.6 billion. The ZEV market is growing rapidly and this year two of our manufacturing partners, Proterra and ChargePoint, became publicly-traded companies with a combined market capitalization of approximately $10.7 billion. Large OEMs are taking notice and coming to California to be part of the ZEV market.

For example, Maritor and Cummins, two large vehicle OEMs, acquired TransPower and Efficient Drive Train, respectfully. OEMs are looking to California for their electrification strategy. And Californians get the benefit of the supply chain experience and the resources these companies bring.

We also want to continue fostering in-state partnerships like the ChargePoint and San Francisco Municipal Transportation Agency partnership that will help bring fast charging to their growing number of battery-electric bus fleets. These partnerships, along with aligning CEC manufacturing investments with Go Biz, sales tax exclusion, vocational training programs, and others, will help ensure that Californians have the best access to high-quality manufacturing jobs.

Thank you for listening to my presentation. And

with that, I will turn it over to Larry Rillera. Thank you.

MR. RILLERA: Great. Thank you, Jonathan. Appreciate that.

Good morning, everyone. My name is Larry Rillera and I lead our team in investments for ZEV manufacturing, workforce, and equity. I will be providing an overview of some of our investments and forward-thinking thoughts in the workforce training and development space for the Clean Transportation Program. Next slide, please. Sorry about that.

At the inception of the program, the emphasis by the State was on green collar jobs. The primary focus was on jobs and training for solar panel installation. The Green Collar Jobs Initiative eventually broadened this focus to include alternative fuel and advanced vehicle technology. At the CEC, the strategy was to leverage the administrative mechanisms and workforce training and development knowledge of our sister state agencies, like the Employment Training Panel.

In the evolution of the Clean Transportation Program's Workforce Program, new partnerships, with the California community colleges, and new projects, like the Transit Maintenance Training Apprenticeship, were early contributors to staff knowledge and capacity. These

efforts also helped cultivate new thinking and community-based and industry-based concepts for workforce development in the advanced and clean transportation space. Next slide, please.

Fast forward 13 years, $36 million, and 20,000 plus trainees, and we have the five current projects noted here. Bottom-line drivers of these new workforce efforts include: Specific market and technology-based application, a need to pair early technology deployments with training, a need to reach earlier into career transportation pathways at our high schools; deep policies and investments in ZEV and equipment; and an exploration of training at scale in the heavy-duty truck and performance spectrum in the freight sector.

The other significant maturation of the workforce portfolio is on full and intentional investments and opportunities for frontline and equity communities. This commitment was addressed in the starting of new ZEV curriculum for certificate and degree programs with the California community colleges and training for electric school bus technicians and operators as a companion project to the CEC's $94 million plus school bus replacement program that prioritized awards for schools located in disadvantaged and low-income communities. Next slide, please.

One particular highlight I would like to draw your attention is to our ZEV High School Pilot Program. The CEC worked with at least 10 community colleges to identify feeder high schools with automotive career technology education programs. The thinking was to establish ZEV curriculum, develop hands-on experience building an EV, and provide a launching point into ZEV career education at the colleges, and, finally, to position the students for careers in the technician space, business ownership in the ZEV supply chain, or preserve further clean transportation education.

A $2 million investment has yielded the participation of 28 high schools, over 1800 students have been enrolled, and over 36 high school and college faculty have been trained to date. Because of the explosion in the need for ZEV service technicians, the CEC augmented this program by another $1.5 million. Additionally, the program will not only grow ZEV automotive programs, but will also establish brand new ZEV truck programs.

Consistent with my earlier comments on investments and equity communities, this program, 100 percent of the funds are used by schools located in these very communities. Next slide, please. Thank you.

The field of zero-emission vehicle technology is very dynamic. There is no shortage of learning and new

awakening especially in the workforce space. The Clean Transportation Program staff participates in many proceedings; keeps abreast of reports and industry analysis; and has discussions with industry, market, and business regarding trends and issues in this workforce space. Collectively, these policy efforts and market development inform the development and recommendation for funding to achieve clean transportation, economic and employment objectives. Next slide, please.

So what lies ahead for workforce. Earlier this year, staff announced a workforce funding concept in partnership with the California Air Resources Board. The idea ZEV workforce: Inclusion, diversity, equity access, and local, is the next logical workforce investment by the CEC, especially with CARB a project partner. The ideas of the ZEV workforce pilot focuses investments on: ZEV training and skills development, supports community-based training and career transportation pathway development, intentionally includes and expands training to frontline equity and tribal communities, and requires an explicit connection between training and employment. The solicitation is expected to be released this summer. Next slide, please.

Great. Thank you. And I look forward to participating with you in the rest of this workshop.

MS. RAITT: Thanks, Larry.

So, Commissioners, if you have any questions for staff, we can do that now. And also I just wanted to let you know that we also have Hannon Rasool, who is the FTD Deputy Director available; and Tami Hass, who is the Supervisor for the Program Integration Unit; and Charles Smith, the Manager of the Transportation Policy Analysis Office, available to help address any questions.

COMMISSIONER MONAHAN: Well, I can start. A question, I don't really have a question but I do have a comment. I just want to thank Susan and Jane, Thanh, Marc, Hieu, Jonathan, and Larry for their presentations today, and actually the whole team of the Fuel and Transportation Division for all their work in this space. I mean it was really impressive to see and kind of the who's who of successful projects in the Clean Transportation Program.

I want to highlight one of the remarks that Marc made about CARB and CEC working together on a drayage truck solicitation. Those are the kinds of projects -- and Larry also mentioned some collaboration on the ideal workforce investment -- that, you know, we really want to go forward with as one state, not individual agencies with all their bureaucracies. And I think these are examples of ways that we're working closely with CARB. They are

focusing more on the vehicle side. The Energy Commission is focusing more on the infrastructure, tool side. And just working together to make sure that we can do all we can to meet the State goals for clean transportation.

And you know there was also I think both Jane and Thanh mentioned that there is a gap between what our goals are for infrastructure for zero-emission vehicles for both hydrogen and battery plug-in electric vehicles. And the most recent budget that was signed will -- should fill that gap -- I mean it should not just fill that gap, we should actually be able to accelerate investments to beyond just the gap that we're identifying in the infrastructure side for our 2025 goal.

So I do think, you know, these descriptions are really super helpful in terms of bringing to life how these investments are helping real people, real companies, you know, get cleaner air through cleaner transportation. And I think you will note that these were all descriptive, so they're not numerical in terms of dollar invested greenhouse gas emission output. And I think we need to marry this kind of description of impacts with the numerical.

And, as I said before, the numerical can be challenging, so. But we do want to hold ourselves accountable to, you know, thinking about this in terms of

how do we really -- how do we really promote equity, how do we really promote an efficient use of dollars invested per GHG ton reduced. And we need to think about this in a really holistic way. So I do think it's impressive to see how the team has evolved with team and how we are now, I think, our attention to equity is greater than ever before.

And Larry didn't talk about this but some of the work that he and others are leading in terms of how to better define what a benefit is to a community, to a disadvantaged and low-income community, and then how do we hold ourselves and are accountable to making sure that we are supporting all Californians in our investment.

So more of a commentary than a question.

Commissioner McAllister, do you have any questions? I'm so close to this work with the Fuels and Transportation Division, I'd be curious to hear your thoughts.

(Pause in the proceedings.)

COMMISSIONER MONAHAN: Heather, is Commissioner McAllister still here or did he have to pop off?

MS. RAITT: Just checking that. I think he is still here but he may not be available at the moment.

COMMISSIONER MONAHAN: Okay. Then I think we could move onto the NREL presentation.

MS. RAITT: So thank you, everybody, on the CEC staff. That was great.

So we'll move onto -- we have a presentation on the -- from the NREL, National Renewable Energy Lab. And so we have Chad Hunter, who is the Team Lead and Senior Engineer; and Christopher Neuman, who is a Senior Research Engineer; Ranjit Desai, who is a doctoral researcher; and Madeline Gilleran, who is a research engineer. And so they will be doing a tag-team presentation. And I will go ahead and pass it off to Chad.

Go ahead. Thanks, Chad.

MR. HUNTER: Okay. Thank you.

Great. So good morning and good afternoon, everyone. So my name is Chad Hunter. I'm a Team Lead at the NREL Center for Integrated Mobility Sciences, and I will be presenting the CC -- CTP benefits analysis. So, Commissioner Monahan, that quantitative benefit analysis that we have done. And I will be presenting that with my team, Chris Neuman, Maddy Gilleran, and Ranjit Desai here at NREL. Next slide.

For the presentation, we'll start with a quick overview of the benefits analysis, provide some history there. Then we'll talk through some of the major method updates that we have made this -- this year in this iteration. And then we'll jump into the results, which

we've probably broken down into expected benefits and the market transformation benefit. And I will define each of those in the following slid. Next slide.

So the quick recap. So NREL was contracted in 2012 to assess the annual benefits of the CTP program. And, broadly speaking, we break down the benefits into two different buckets: Expected benefits and market transformation benefits. And then within each of those buckets we look at a variety of different metrics, which includes petroleum reduction, GHG reduction, as well as air pollutants such as NOx and PM2.5.

The expected benefits can be thought of those that are directly associated with the vehicles and fuels deployed through projects receiving CTP funds. So you can think of that as an electric vehicle, a display thing, a mile traveled by a conventional vehicle. And so there's a petroleum reduction and a GHG benefit for every mile that's electrified.

Market transformation benefits are a little bit squishier and harder to quantify. But those are really due to the influence of CTP investment on -- the influence of the investment on future market conditions that accelerate the adoption of new technologies. And one way to think about that, for example, is as you install EVSE infrastructure across the state of California, the

perceived value of that valued electric vehicle is increased, and so more people are willing to purchase that vehicle and so there's benefits accruing because of those induced vehicle sales.

And just a quick note that this analysis does not attempt to allocate benefits of these projects according to the different funding mechanisms, whether it came from CEC's CTP funding or if it was also impacted by the CARB's LCFS program or federal tax incentives. Rather, this analysis currently is estimating the potential benefits of any project that is CEC CTP project funded support. Next slide.

At a high level, we calculate the benefits of different projects a little bit differently, depending on the type of project that it is. So fueling-infrastructure projects and vehicle projects and fuel-production projects all are accounted for a little bit differently within our analysis framework. In the middle of the slide you can see a very simplified data flow of the types of data that we take in and the outputs that come out of our analysis.

At a high level, some of the information that comes in from the CEC CTP portfolio include the funding of the different projects, as well as project attributes, such as fuel or infrastructure through-put, fuel lifecycle carbon intensity, project lifetime and maybe vehicle type.

That all feeds into our analysis framework, which includes a variety of stock modeling, vehicle-adoption modeling, and emissions accounting. And then, again, the output is a benefit by metric. So whether it's petroleum reductions, emissions reductions, or even equity and social benefits, we account for all those across these different project types and categories. Next slide.

This is just a snapshot of kind of what the analysis has looked at in the past and what it's looking at this current year. And, in particular, we have had a push to improve some of the market transformation calculation and focus on improving our NOx and PM2.5 emission calculations within the market transformation bucket.

Additionally, we have improved our lens on equity to focus on both fueling infrastructure and vehicles project through a variety of special disaggregation techniques, which we'll discuss later. And then we have also looked at the job creation from CTP investments. And so we'll talk about that new method and the impact that had on future slides as well. Next slide.

And with that, I will pass it off to Chris to talk to some of the method updates that we have improved this year. Next slide.

MR. NEUMAN: Hi. So the first method update

that we're going to talk about is the ETL, or Extract Transform & Load. And this is where we take the data that the CEC provides and we have turned it into a more database-friendly format.

One of the first we have updated is demonstrated through-puts. So through-putter usage has been updated with guidance to rely more on the measure of usage rather than in an assumed funded production. And this also includes the annualization of the observed production.

The CALeVIP inclusion is a bit new too. So not only including the built stations but also of the expected. So the nonplanned rebated funding has been included with the following assumptions. Rebate money was allocated. It was allocated but not currently spent. It was used to determine how many EVCS would be established with the remaining funds.

The new stations were randomly distributed to locations proportional to the geographic distribution of current locations. The rollout was done in a linear fashion, so the expectation is that it will be linear from the start of the project to near the end. And the distribution of Level 2 charging versus DCFC mirrors the historical breakdown between the two levels. Next slide, please.

I will be handing it off to Ranjit.

MR. DESAI: Thanks, Chris.

So in this slide we are going to look at like the EV station utilization. So necessarily what we're looking at are the electric miles. By electric miles, we mean the miles you -- everyone buy the electric rate because using the public charging stations. So until 2020 we used to use the EVI-Pro model, which we have at NREL, the estimate the utilizing of charging stations. This year, we have changed a little bit where at NREL we have the dataset from charging stations in California, so we estimate for like Level 2 we all one million charging stations, for DC we have four million charging stations. And from there we estimate the kilowatt output per day from the public charging stations only. So, as you can see the situation, we have the Level 2 and DC chargers and the number of chargers. And then we use the electric miles estimated from like these charging stations to estimate the electric miles a day for annual, for one year.

This will be used for like, you know, estimating to benefits from electric vehicles. A possible update, we are looking at is like, you know, separating out these public charging stations with respect to the land use type. For example, a public charging station versus a multi-dwelling household, etc. Next slide, please.

This slide shows two different projections. On the left-hand side, we have the projections of utilization from these public charging stations. On the right side, we have the grid intensity for California. So the utilization for charging stations, we use the EVI-Pro model here, assuming that the DC fast chargers stays at fifty kilo watt and what happens in the future with respect to the utilization.

And then, as use is increasing, we are also looking at what happens on the grid side. On the part of the grid side, we use the NREL's Cambium dataset where we have the hourly electrical production data. And from there we can find out the grid intensity and gram of CO2 per mega use of electrical production. So we use one scenario in this case. That is the mega case scenario and estimate the decreasing carbon intensity. And using these two projects, since we estimate the benefits are to electrical vehicles. Next slide, please.

MR. HUNTER: Thanks, Ranjit.

And so similar to the EVSE infrastructure, we wanted to update the way that we were counting for hydrogen-refueling station benefits. And so, broadly speaking, we take hydrogen-refueling stations, calculate basically how much hydrogen is going through those stations into the vehicles and then compute how many miles

are being driven by fuel cell electric vehicles instead of combustion or internal combustion engine vehicles, and then it can account for the benefits there.

And so in the past we have broadly used a five-year ramp-up for hydrogen-refueling stations basically between completing the station to getting to a utilization plateau that we had assumed was 80 percent utilization of that station. But for this analysis, we have updated that plateau to be closer to 45-percent utilization based on the station's nameplate capacity. And that's based on the data kind of shown here to the left, which is real world data from the State of California.

Additionally, as you saw with the EVSE infrastructure accounting for the grid getting greener over time is important. Similarly, accounting for hydrogen, carbon intensities, improving over time is also important. And so we have incorporated that into our analysis to account for respectively the carbon intensity of hydrogen, if that does go down over time, we account for the benefits of that, and we use the project proposals to define kind of that trajectory of carbon intensity for the hydrogen fuel pathways. Next slide.

MS. GILLERAN: Great. And then -- can everyone hear me okay? Great. So in understanding the equity portion of this project and also the social benefits, it

was important to understand where the benefits were occurring. So for projects from CEC where we understood to some extent where the benefits could be occurring, such as for the refueling infrastructure or the vehicles-related projects, we calculated where those benefits were occurring two separate ways.

So for the fueling infrastructure projects we used the geo spatial information from where the EV stations and hydrogen stations were, and assumed the majority of the benefits would occur in the vicinity of those stations. And then regarding the vehicles-related projects from CEC, we used NREL internal Class 8 fully truck travel data, where we had the emphasis of where trucks were at each hour. And we assumed that there was a higher penetration -- where there was a higher penetration of truck instances was where there were greater benefits in that area, if those trucks use alternative fuels. So we use these two approaches and aggregated up where the benefits were occurring to the census tract and then overlay that data with the CalEnviroScreen Draft Version of 4.0 to see if those benefits were occurring in disadvantaged communities.

Now I will hand it back to Chad to talk about the jobs creation benefits.

MR. HUNTER: Thanks, Maddy.

Next slide. So as mentioned before, this year is the first time we wanted to estimate the job creation impact due to CEC's CTP investments. And so we have leveraged the IMPLAN model, which is the Economic Impact Analysis for Planning models, to quantify the direct, indirect, and induced job creation from CEC's CTP investments. And so kind of inputs into that model include CEC investment as well as match investment. And we break that investment down according to the industry sector that it is most applicable for and then we put that into IMPLAN.

And what IMPLAN basically does is it says, okay, here is the direct investment of that -- of that funding. And then it also looks at, okay, what funding stays in the state of California, what leaves due to imports. And then for the stuff that stays within the state of California, those goods and services, how does that ripple through the economy to do either business-to-business transactions or also turns into income for individuals, which then goes back into other businesses' transactions.

And so the output of IMPLAN is effectively the direct, indirect, and induced jobs that are created. And we summarize that in the following slide. Next slide.

MR. NEUMAN: So in market transformation there is an enhancement as well of the EVSE willingness to pay

for WTP. The update is to move to the Greene, et al., "Quantifying Tangible Value of Public Electric Vehicle Infrastructure" analysis. The past method was less multi-dimensional and mostly focused on the difference between charging stations and current, existing petrol fueling infrastructure. So you can see the update on the left has moved for PHEVs to the upper right graph and for BEVs, battery electric vehicles, to the lower right. Next slide, please.

So the move from the perceived value to the willingness-to-pay method comes with many enhancements. Willingness to pay includes new factors. So the plug-in electric vehicle fleet average range, so the impact as the range gets further, how much people value charging infrastructure. The value of the time, so how fast you can charge, Level 2 versus DCFC. The value of local charging versus regional, to travel between major cities. Moving from the gas station mode to a comparison of -- to fully electrified mode, so how much electrification you would need to fully electrify all vehicles.

One of the assumptions that was key as well is that when public charging, fast charging, DCFC, is expected to be the infrastructure of choice 80 percent of the time, and at the bottom you can see the accumulated benefits year over year for battery electric vehicles and

plug-in electric hybrid electric vehicles by the California major urban areas. Next slide, please.

MR. HUNTER: Thanks.

Additionally, within the market transformation calculations, we made a couple other general updates that we wanted to point out. First, we're using -- and moving over to NREL's SERA stock model, so that's the Scenario Evaluation and Regionalization Analysis model, it's a long name there, but effectively that stock model comes with a variety of benefits. And we calibrated that to the Air Resources Board's California Vision 2.1 model, so it represents the California stock quite well.

And the market transformation benefits within the SERA model are now implemented on a rolling schedule, which account for that continued CTP investment over time. So as Chris just showed, as infrastructure investment occurs over time, we can more accurately reflect both the marginal benefit of that investment occurring at each year throughout the analysis timeframe.

And, additionally, we made a couple data updates that has pretty large impacts on some of the results in compare with previous years. So, for example, using the California Vision 2.1 data as the base market share for vehicle adoption modeling, as well as updating our purchase price projections for alternative powertrain

vehicles based on CEC Energy Assessment Division data. And, again, that really comes into play when you're thinking about how much does an electric vehicle cost versus a conventional vehicle. That price premium or price advantage really impacts the relative likelihood of people adopting that vehicle. And so these have pretty big impacts on the vehicle adoption modeling and some of the results. We do want to point that out here. Next slide.

All right. So with that we covered some of the methodological updates for the expected benefits piece, and then the methodological updates for the market transformation analysis. And now we'll jump into the results first focusing on the expected benefits results. Next slide.

MR. NEUMAN: All right. Thank you, Chad.

So the project funding summary, from the pie chart -- pie chart here perspective, but the $934 million accounted for versus $671 million in the 2019 Benefits Report, you can see the breakdown of the major categories, and then the subcategories are outlined here in the funding provided. Next slide.

So the expected benefits from fuel production, the method was petroleum reduction and GHG emission benefits accrue because of the alternative fuels directly

-- when the alternative fuels directly displace conventional fuels. We resolve -- all fuel production types provides substantial petroleum reduction, and the reduction ramps up over time as fuel-production projects achieve their target performance. Next slide, please.

So here you can see a further breakdown in the fuel-infrastructure area. The method is fuel production at the refueling station as refueling stations are converted to an estimate of how many conventional vehicle miles were displaced. Petroleum reduction and emissions benefits accrue because the low-emission vehicle is driven instead of the conventional vehicle, so the conventional vehicles are being replaced and production continues.

The results: Electric vehicle charger benefits significantly higher than the previous analysis due to updated emiles and grid-carbon intensity account. Hydrogen projects, as mentioned in earlier CEC staff presentations, have benefitted due to the new GFO-19-602, supporting larger and expanded stations as well. Next slide.

Expected benefits for vehicles, petroleum reduction and emission benefits accrue because the low-emission vehicle is driven instead of the conventional vehicle. Manufacturing and project benefits were moved in this iteration to market transformation benefits, and this

had to do with them fitting better in that area.

Natural gas trucks results provided significant petroleum reduction due to displacement of commercial vehicles with high diesel fuel consumptions. And GHG reduction is nominated by vehicle price rebates due to higher powertrain efficiency and lower-carbon intensity electricity. Next slide, please.

So the expected benefits for me -- sorry -- the total benefits are shown here into total petroleum reduction and GHG reduction. And the fuel production and fueling infrastructure projects result in the largest petroleum reduction and GHG reduction benefits. Vehicle projects historically were dominated by a manufacturing project, but were accounted for as market transformation benefits for this work.

Over 200 million gallons of petroleum reduction and 2.5 million tons of GHG emissions are reduced in 2030. Next slide, please.

And here you can see the tabular breakdown of all the categories, subcategories. And over here for each year, not cumulative, and then the grand total up here. Next slide, please.

MS. GILLERAN: Thank you, Chris.

So regarding the results for the equity analysis, again we combined that Approach Number 1, which

was looking at where the fueling stations were occurring, and also Approach Number 2, which we looked at vehicle travel data to aggregate up the benefits by each census tract and then overlaid that with the CalEnviroScreen results, finding that when we especially disaggregate the benefits, we find that 40 percent of reductions happen in disadvantaged communities. And then if you go to the next slide.

And then in order to estimate the social benefits or the public health benefits in each census tract, we use the EASUIR model, which was developed by Carnegie Mellon University. And EASUIR stands for: Estimating Air Pollution Social Impact Using Regression. And so EASUIR estimates the social cost of emissions in the United States geospatially based on the exposed population and atmospheric variables, primarily using PM2.5 for particulate matter and NOx emissions, because they can cause both human health issues as well as natural environmental problems.

So once we have the information on PM2.5 and NOx benefits from the CEC by census tract, we use the EASUIR model to see what the 2.5 dollars per ton by census tract and also the NOx by census tract, and basically multiplied the benefits from CEC by this coefficient from EASUIR to see the total social benefits by census tract.

And now I will hand it off to Chad, I think, to talk about the jobs modeling results.

MR. HUNTER: Awesome. Thanks, Maddy.

Next slide. Great. So on the job modeling, as a reminder, we use IMPLAN as our modeling for the market. The input in IMPLAN is really kind of the data shown here. So we break out project investment according to different industry sectors, according to the North American Industry Classification System Codes, so that's kind of summarized here by sector at the top, which obviously is a variety of vehicle manufacturing sectors and industrial equipment manufacturing sectors.

And then we can also look at that funding breakdown as a function of time, which is showing in the bottom slot, which shows that a typical investment between 60 and 80 -- or $80 million per year, which is what we have accounted for here.

I will note that we didn't have the capability of accounting for ongoing investment or spending from the companies or projects that are funded from CEC CTP funding, so we just account for the initial investment, which kind of gets the project up and running. But then obviously there is this continued investment and operations investment, which we are accounting for. So the jobs results that we're going to show on the next

slide are ultimately very conservative from our perspective. Next slide.

And so the output of IMPLAN based on that just investment, upfront investment, shows that roughly 4,000 full-time jobs have been created across the state of California. And some notes on that is that a lot of the direct impact of really some of the higher investment sectors is estimated to occur outside of California, so effectively importing some goods and services into the state of California based on IMPLAN's original absorption coefficient.

Additionally, there are high levels of automation in manufacturing in different manufacturing sectors that a lot of funds go into, and that also results in relatively few jobs created per dollar of investment. But, in general, what IMPLAN is estimating is that on a typical year, 200 to 400 jobs are created due to CEC's CTP investment. Next slide.

Awesome. And so with that, that's the expected benefits results and now we'll move into the market transformation results, and I will pass it off to Chris.

MR. NEUMAN: Thanks, Chad. Next slide, please.

Great. So the market transformation perceived vehicle price reductions. These apply to the electric-vehicle charging stations and the hydrogen-refueling

stations. While the hydrogen-refueling station methodology hasn't changed from the previous year, that was gone into with less depth, but it's basically equivalent to the electric-vehicle charge station modeling where the amount of infrastructure has the perceived benefit and induces vehicle sales.

So as we can see, that there is a high and low reduced vehicle sales for electric vehicles, hydrogen vehicles, and PHEVs. The high and low have to do with the demand elasticity within each area. And with the induced vehicle sales and the replacement of conventional vehicles, we then see the emission reductions on the right-hand side. So we have low and a high level of CO2, NOx, and PM2.5 by each year and by vehicle electrification type -- sorry -- and hydrogen as well. Next slide, please.

So market transformation vehicle cost reductions, this involves CVRP, EV component manufacturing and, EV manufacturing. So we have the induced-vehicle sales, once again broken out by the three main technologies here. And, as you can see, there is a fairly large drop in 2014 from the both high and low scenario. This has to do with a methodological change from -- a move from a share price reduction examination to our more cost reduction enhancement, as learning by doing. So as the

market learns, the transformation occurs and then things become easier and cheaper to manufacture.

And you can see the kind of corresponding emission reductions from these three categories are then shown on the right with all the CO2, NOx, and PM2.5 for each demand of the elasticity again. Next slide, please.

And this is the -- this --

MR. DESAI: No problem.

MR. NEUMAN: Yeah, this is the overall -- sorry. I need to hand this off to Ranjit. Stepped on his a bit.

MR. DESAI: No problems, Chris..

So these are the estimated market transformation benefits of, at once, fuel production. And so high and low prices depend on this, which we have collected from each project. So for each project level, we estimate the project level cost per like dollar per CO2. And from there, what we do is like at each project, we are -- project level, we also add like an estimate of this cost. And at the end we estimate the final cost of GHG reduction, which is the metric ton CO2 per dollar. And here -- so I think the key part to look at here is electric heavy-duty rate and the gaseous medium- and heavy-duty trucks. Those are the ones which have the highest benefits.

And I think for the last couple of results, I

will pass on to Maddy.

MS. GILLERAN: Thanks, Ranjit.

So I need 14, the next slide. Thank you. Yeah.

So the next generation biofuels include biomethane, diesel substitutes, and gasoline substitutes. So seen in this slide, we expect that diesel-substitute projects have the greatest impact on reducing petroleum and GHG. And we expect a total of between 42,- and 169 million gallons of petroleum would be replaced in 2030 by these projects as well as between 204 and 1,200 tons of carbon dioxide equivalent GHG reduction. And then you could progress to the next slide.

And then this is showing the total market transformation results summary in a tabular format in the year 2030 alone, breaking it down by each project type and showing the high and low scenarios.

So seen at the bottom of the slide, we expect between 168 million gallons of petroleum replacement and 824 -- or, sorry -- 2,350 GHG production, thousand tons carbon of gas in the pipeline.

And that concludes our presentation. Thank you for your time and let us know if you have any questions.

COMMISSIONER MONAHAN: Thank you. I have so many questions. I've got a lot of questions. Maybe I'll ask one or two, and then if Commissioner McAllister has

some questions, I will let him, and then go back to asking more questions. But this is something I know we talked about when we met a number of months ago, but how are you apportioning impacts from the investments from the Clean Transportation Program vis-a-vis other policies, like the Low-Carbon Fuel Standard? And now the Low-Carbon Fuel Standard you know, for -- it used to be just classes and now there's cash-free credits for hydrogen and for battery-electric charging infrastructure. So how are you treating that?

MR. HUNTER: Hey, Commissioner Monahan, yeah, that's a really great question. Not something that -- I think we have been thinking about but haven't tried to tackle in previous analyses or in this analysis yet. So historically we have looked at CEC CTP program investments across all projects and simply count the benefits according to those projects.

I think it gets really hard to say what benefits should be accrued and go to kind of which funding mechanism because there's definitely like tipping point analyses, for example, you know, projects may have some financial support but they won't be feasible economically and be implemented until it hits some threshold, so who really gets that threshold and at what point does that threshold -- you know, it becomes a very hard challenge

that -- I think we're thinking through the best way to approach that. And I hope that at some point we could -- could try to tackle that, but thus far we haven't really looked at that. But I do think it's a really important point that we try to make and we can definitely try and make that a little bit more clearly in the future report.

COMMISSIONER MONAHAN: Yeah. I think -- I mean for us that would be really helpful because we're trying to figure out how do we make sure that we are using our money wisely. And if a policy is driving the investment, then we just have to think through, well, does it make sense for us to continue to invest or do we change our investment strategy. And, as we know, it's a huge driver in terms of investments.

Then I'm curious about the induced vehicle sales on infrastructure. Can we go back to a couple of those? I think there were two slides relating to that or maybe just one. Can you show that slide? Can somebody show that slide back? Let me see it, I think I can --

MR. HUNTER: Maybe while that slide is being pulled up, I will note one other thing, assessing effectively the impact of different investment, so there is another task that a parallel team here at NREL is working with the CEC on to assess the impact of certain investments for different EVSE infrastructure, for

example. So there is another R&D effort that's trying to look at some of that. And we actually just had a really great discussion with the larger CEC leadership team and NREL leadership team yesterday to decide on if there is an opportunity to integrate both analyses to think about, okay, how can we optimize a portfolio of clean transportation investment and what would that portfolio really look like in the context of uncertainty. And so just a quick note there, as a follow-up.

COMMISSIONER MONAHAN: It's slide 28 that I was interested in. So can you walk me through how the induced vehicle sales look for, let's say, for hydrogen. We have -- you know, let's say we reach -- when we reach the 200-station goal, that should be enough for at least -- you know, I think it's between to 40,000 to 50,000 fuel cell electric vehicles, would you assume that our -- just so I understand, that with -- I think it was 40-percent utilization; is that right? That every station is utilized at 40 percent. And that --

MR. HUNTER: Up to 45.

COMMISSIONER MONAHAN: And that is what would drive -- so, basically, it's assumed that each station, once you build it, 45 percent will be used. And that will drive vehicle adoption. Is that right?

MR. HUNTER: So may be there is -- there's two

things here, and gas is a little confusing. So on the expected benefits side, we assume that the refueling -- or the hydrogen-refueling stations that have been proposed and funded thus far will be built and there's a certain nameplate capacity there. And so the utilization of those proposed stations that are already agreed on will full increase up to that 45-percent threshold. And that's all market transformation benefits. On the -- or, sorry -- expected benefits.

On the market transformation side, we do a little bit of a different analysis where we say as the hydrogen-refueling stations are rolled out across the state of California, how does that reduce the perceived price penalty of fuel cell electric vehicles. So basically as a consumer I'm going to have to drive only two minutes to get to a hydrogen-refueling station instead of 15 minutes. And so the value of that fuel cell electric vehicle is then increased and that results in induced -- induced fuel cell electric vehicle sales. And so that's really what we're trying to capture here in this slide, which is every incremental station provides that larger network that individual consumers will see. And so that relative perceived price of a fuel cell electric vehicle is decreased, and so adopt more of them more frequently.

COMMISSIONER MONAHAN: I See --

MR. HUNTER: And I think Chris can -- oh, go ahead.

COMMISSIONER MONAHAN: Well, and so you're taking vehicle pricing into account and doing some assessment of what fuel cell prices will do over the next 10 years and what battery-electric vehicles will do over the next 10 years?

MR. HUNTER: Correct. Yeah, so we take those price projections and then we effectively reduce them by some amount due to the infrastructure kind of penalty or, in this case, reducing that infrastructure penalty. And then that reduces the effective price of that fuel cell electric vehicle, and then that goes into our adoption modeling.

COMMISSIONER MONAHAN: Great. Thank you.

Commissioner McAllister, did you have questions you want to ask?

COMMISSIONER MCALLISTER: Well, I just am fascinated. This is so much good information. And I'm not in this field every day all day like you are Commissioner Monahan, so I really -- it's a little bit different than building. But I was -- so I really am just happy for you to take the lead here. But I was interested maybe in -- and I did have to step out for a little while

to attend to some other things, so if I missed this I apologize. So what do you -- it's interesting to see the benefit, the sort of revised benefit, and I'm looking particularly at, let's see here, slide 18 or 19, I think. Hold on a second. Yeah, 19, I guess. But the results on the electric charger benefits, it looks like they went up because of the updated emiles and grid carbon intensity accounting. So how do you describe or how do you explain the updated emiles? Is that just based on sort of updated data and, you know, monitoring of how much people are driving EVs or was there some other driver there?

Okay, --

MR. HUNTER: Yeah.

COMMISSIONER MCALLISTER: -- looking at number 19 there, the results on the bottom.

MR. HUNTER: Yeah, definitely.

Ranjit, do you want out walk through the emiles correlation update and kind of how we improved this year versus previous analyses?

MR. DESAI: Sure. Yeah. Thank you, Chad.

So I think that's on the slide 8.

COMMISSIONER MCALLISTER: Oh, I'm sorry. I might have missed that.

MR. DESAI: Yeah. That's the base of these results. Yeah, this one. Sorry. Thank you.

So what we have done here is like for the current utilization, we use the charging data results, so we -- addendum, we have the -- you see the alternative fuel data center where we maintain the data setoff like, you know, charging stations. So what we have done in this one is like for Level 2 we have over a million charging stations and for Level DC we have over four million charging stations. So from there we can estimate the -- like, you know, the energy consumption per plug per day. And from there, we use the efficiency kilowatt per mile to estimate how many miles one way could drive use to -- based on that energy consumption. And from there we estimate like annual electric miles. So by new electric miles, what we mean is like if the -- like the electric vehicles use the public charging stations, how much energy they will consume in one year and how much electric -- or how many miles that would result from that energy.

So based on this assumption, we estimate the current benefit, and if you move to the next slide, so in this one we have the projections of emiles and as well as the grid intensity. So the emiles increase from now into the future. And for that, we use the EVI-Pro model.

The EVI-Pro model is another inhouse model where we look at how we like, you know, use of electric grid could still change and how number of EVs are going to

change into the future. And based on that, we estimate like how much would be the project energy or charging utilization. And that we use to -- use to calculate the benefits you are looking at.

And on top of that we have the projections of the electric grid intensity and -- which is like, you know, as the grid gets better we have like better -- like benefits from the electric ratepayers.

COMMISSIONER MCALLISTER: Yeah. So your core data that you're sort of starting with and then deriving -- using models to derive these results from is actual sort of utilization level of some collection of chargers --

MR. DESAI: Yes, yes.

COMMISSIONER MCALLISTER: -- total kilowatt hours and then you sort of derive all this from that?

MR. DESAI: Yes.

COMMISSIONER MCALLISTER: Okay.

MR. DESAI: And it is California based, it is the data from only California which we use for these estimates.

COMMISSIONER MCALLISTER: So are you surprised by these results, that utilization is higher maybe than in previous analyses or that, you know, the estimates for emiles went up?

COMMISSIONER MCALLISTER: The projections are

from the current ones which we are looking at right now. These are based on the EVI-Pro model. But the ones we saw in the past out like are very in line with what we are seeing at other places as well. And I think most of the analysis we have done at and will come at different places are very in line.

COMMISSIONER MCALLISTER: Great. Great, okay. Well, thanks a lot. I mean it seems like a really great -- an excellent market transformation story that's happening and we're sort of in the midst of, so that's great to see. Yeah.

MR. DESAI: Thank you, Commissioner.

COMMISSIONER MCALLISTER: Thank you.

Thanks for showing me that --

COMMISSIONER MONAHAN: Can we --

COMMISSIONER MCALLISTER: Go ahead.

COMMISSIONER MONAHAN: Yeah. Can we go to the equity slide, equity benefit slide? I think it's 23 or 24.

So spatially disaggregating benefits by census tract, I was surprised, I thought it would actually be a higher percent than 40 percent of the reductions are happening in disadvantaged communities. But have you also looked at low-income communities? I wonder if that is something that could be added to this analysis. We tend

to think of disadvantaged and low income together.

MS. GILLERAN: I can reply to that and chat about that. But the main thing, I'm using the CalEnviroScreen, like the Draft Version 4.0, and assign to those which have a CI score of greater than 75 percent during that top five percentile. I can also do an analysis like lowering that to see what that would do. I'm not sure if the margin has become level data, but I could see if it does represent any other like geospatial maps. I could join that with the data as well.

COMMISSIONER MONAHAN: And maybe I should verify. Is Larry or anybody from the CTP team who is tracking how we quantify low income on the line still?

This may be something we follow up with you about, but, you know, when we -- the slide that we showed, that the team showed on investments that we've made, we break out low income, we have disadvantaged, low income, and then we tend to look at them together. And it would be nice -- it would be great if the analysis could -- could line up with what we're doing in terms of how we're describing our investments on the Clean Transportation Program.

Oh, I see Larry's here. Larry, what do you think?

MR. RILLERA: Yeah, Patty, thank you for that.

I think not just sort of DAC, we do have some information, low income, LIAC, LIH as well. I know we received some public comment with respect to rural, in particular. I think that analysis, there's some data, and we can certainly talk a little more offline there. And some work of the Strategic Growth Council, so there may be some datasets available as well.

MR. NEUMAN: Awesome.

MR. HUNTER: Yeah. I mean if you have any spatial information about that, that would be great to merge them together so we're kind of apples to apples in our analysis. Great.

COMMISSIONER MONAHAN: And, Maddy, does the analysis when it comes to medium- and heavy-duty vehicles that are operating statewide, how did you apportion the amount of pollution that is -- or pollution reduction in disadvantaged communities?

MS. GILLERAN: Yeah. So I think we used the real world truck data and saw it's each hour for like around four percent of trucks in the U.S. and just looked at the California data and saw where like the most points were occurring throughout the California. And then we saw where each point was throughout each like that long, and then looked at census tract area and took the total vehicle instances dividing by census tract area to see

where the most like vehicle instance per area could be. And then we kind of estimated the total vehicles related benefits through all of California once having all the projects, so standards like fifty millions of gallons displaced from PM2.5 reduction. And then disaggregating that way, of multiplying -- or I guess dividing out the various vehicles per area by the total petroleum production. That's how we like spatially disaggregated it.

(Tones.)

COMMISSIONER MONAHAN: Okay. And I guess a similar question when it comes to the impacts of refueling infrastructure for medium- and heavy-duty vehicles, I mean these vehicles tend to use a lot more fuel than light-duty. And so like the 45-percent utilization for hydrogen on light-duty station, one could argue that for medium- and heavy-duty, the utilization would be much higher, and that goes for battery-electric or fuel cell electric, or fuel displacement, for that matter. Just -- are you accounting for kind of the greater miles in utilization in the medium- and heavy-duty world than light-duty?

MS. GILLERAN: Chad, do you have an answer to that? I'm sorry. I'll hand it off to you. I don't know.

MR. HUNTER: Yeah, I can maybe take a stab at, I'm sure. I think Chris might have some ideas as well.

But at a high level, so there's a couple different types of projects. Like, for example, there's projects that fund both the vehicle and the fueling infrastructure to support that medium- or heavy-duty truck or bus. And for those we typically look at the VMT schedule of the bus or the -- of the truck, and so we do account for that higher kind of fuel consumption, higher travel from the vehicle perspective. But on the light-duty side, yeah, we have -- we just use the refueling station through-put.

And, Chris, I don't know if there is anything else you wanted to add there. You know, we've talked about that a couple of times this year.

MR. NEUMAN: Yeah. I mean for the medium- and heavy-duty, obviously as you might guess, the medium-duty, it's a real challenge just because of the diversity of vehicles it's really complex. We kind of relied more on a very, very rich dataset for heavy-duty for this equity study. It is time that they -- a first attempt to get much more accurate measurements in the neighborhoods through this methodology. So in the future I think that we will probably also develop further advancements to the heavy-duty and medium-duty areas.

COMMISSIONER MONAHAN: Yeah. I think that would be really -- I mean this is such an opportunity, I think,

in California to build out that infrastructure for medium- and heavy-duty vehicles, where we get this two-for for air quality and of course equity benefits, but that also they use so much more fuel, so we -- presumably the benefit, even though the cost is much higher, the benefits are as well. And that's something, you know, in the most recent budget, the Governor and the Legislature have really prioritized reduction of diesel pollution and investment in ZEV infrastructure for medium- and heavy-duty vehicles. And I do think there is terrific opportunity on the analytical side to both, you know, just the direct but also the induced.

I think a lot of companies too are afraid to invest in ZEV because there's no infrastructure. And this is an area where like if we can build the business case, it's not like consumers that are -- I mean I feel like on the light-duty side it's really hard to model induced because consumers like their attributes. They care about what's cool and what looks good. And you can't really model that very well, so I think that's just something we should be aware on the light-duty side, that it's very hard to model consumer choice. Very, very hard. I think you're doing a great job, but you're taking a very simplistic view of what consumer adoption will look like because consumers care about attributes that we don't

fully understand.

But on the medium- and heavy-duty side, the attributes are really like simpler, right. It's a business saving money at the end of the day, and can they get from point A to -- they move their goods in an efficient and swift manner, you know, so then you can have huge adoption rates. So we're trying to figure out the right investments to be able to capitalize on that opportunity, create a business case, and have the market take over on its own.

And I guess one -- can I just keep going? I'm not sure, Heather. You could cut me off when it's time. But --

MS. RAITT: Keep going, please. We're ahead of schedule, so you're fine, no worries.

COMMISSIONER MONAHAN: Okay, okay. So is there like one slide that rules them all in terms of the benefits? I got -- is there -- I haven't seen one slide that just like says here is all the investments and here is all the benefits as we have calculated them and here is how these different investments stack up against each other?

MR. HUNTER: Good question. Yeah, we don't have a slide that summarizes both the expected benefits and the market transformation benefits together. We just have

those two slides that summarize each one individually, so we could superimpose those together in a total summary slide. And that's usually what we do in the report. But, yeah, we didn't include that today for some reason. Good question.

COMMISSIONER MONAHAN: And from your perspective as analysts, just, you know, what -- what was sort of the most important adjustments that you have made that have like resulted in changes in the calculation from the last one to this one? What would you categorize is for the top level adjustments that have been made, that had the most profound impact?

MR. NEUMAN: I think part of the data welding methodology really, really focusing on -- or at least for fuel production, focusing on the measure usage over the expected usage was a big piece. So getting that really data-driven measurement values over kind of expected solicitation portion value was -- I think that had an impact on the results over previous years, I would say, from my area.

I don't know if anyone has their --

MR. HUNTER: Yeah. Yeah, Ranjit, do you -- do you want -- it sounded like you were going to chime in there?

MR. DESAI: Yes. Yes. Yeah, I think from

starting utilizing point of view, like when I look at the data itself, like we held it up from 2016 to 2020, it's a good amount of data. And plus like, you know, we have this -- we haven't seen electric grid for some time now, plus the public infrastructure. So getting to -- getting access to such data so it like, you know, what is actually happening in the real world instead of basing it on some studies and like trying to understand trying to stop it from there. So that is pretty interesting to look at it, like the utilizing itself on time from there projecting into the future, I think that was pretty -- pretty good.

COMMISSIONER MONAHAN: Thanks. Okay, I'm going to go on one more tangent. Could we go to slide 25, the jobs modeling? I'm sorry to be bouncing around. You guys put in a lot of information, so I'm trying to keep up.

So on the jobs modeling, so the fueling infrastructure, I was -- I was actually surprised at the vehicles investments were so high, say, in 2018, 2019, and the infrastructure not as been granted as a big spike in 2021. But you know I think of jobs building at infrastructure is really clear. Like you put a dollar in, you could figure out exactly how many jobs you have coming out. On the vehicle side, that's a little harder. Can you walk me through the vehicles, the number, how you got to these numbers on the vehicle side in the IMPLAN model?

MR. HUNTER: Yeah, definitely.

COMMISSIONER MONAHAN: So is that -- it's actually not this slide. It's the one maybe -- it's slide 25, so the one before.

MR. HUNTER: Sorry, too much content.

COMMISSIONER MONAHAN: Whoa.

MR. HUNTER: I think it's up a few slides, yeah. There we go.

COMMISSIONER MONAHAN: Yeah, that's one.

MR. HUNTER: Yeah. And so broadly we're defining vehicles projects like the way that we define in a project, so that could be vehicles manufacturing projects. For example, like motorcycles or light-duty vehicle, electric vehicle. It could be demonstration projects, vehicle demos for medium- and heavy-duty trucks, things like that.

And we broadly define the investment based on the project start year and end year, and do just a linear interpellation between those and say the investments are roughly going to happen nearly, although in real life it will happen in lumpy, kind of -- throughout the project as it hits different gates. So that's kind of how we think about project investment, according to the project classes. So if there are other -- I don't think that answered your question, but is there another question --

COMMISSIONER MONAHAN: Does this include for vehicles, would this include manufactured -- grants we give to manufacturers, would those count?

MR. HUNTER: Um-hum. Yeah, the way --

COMMISSIONER MONAHAN: -- that category.

MR. HUNTER: Yeah, that's how we have defined our vehicles project class, vehicle --

COMMISSIONER MONAHAN: All right. Moving forward we actually have a significant amount of money for manufacturing, 125,- per year for two years, so that will be boosted up to deploy in the future.

MR. HUNTER: Yes.

COMMISSIONER MONAHAN: And do you -- when like let's say for each hydrogen station or for each EVSE project do you have a certain number of jobs associated with that that is in that data?

MR. HUNTER: Not quite. So we basically take the data from the CTP investment, so for a hydrogen-refueling station basically what -- how much money was invested. And then we look at the project budget that was proposed with that funding application to say, okay, what fraction of investment is going to go which type of category. And then -- so we have effectively for hydrogen-refueling stations, you know, for every million dollars we can proportion a fraction of that to the

different industry sectors that generally compose the hydrogen-refueling station, so there's mostly just machinery, manufacturing, and other manufacturing structures, like newly -- sorry -- newly-constructed manufacturing structures is like one of the big categories for building refueling stations. And so we take the total investment for that project, allocate it to the different industry verticals, and then run that through IMPLAN, and then that results in a jobs total number for that project. And so different projects --

COMMISSIONER MONAHAN: Do you --

MR. HUNTER: Oh, go ahead.

COMMISSIONER MONAHAN: I'm sorry, Chad. So these -- are these direct and induced, or just direct?

MR. HUNTER: So shown here is just direct investments. And then there's going to be some multiplying effect of that investment over time, which we didn't show here, but really the jobs would reflect direct investment, indirect, and induced ongoing ripple effects through the economy.

COMMISSIONER MONAHAN: Okay. So it will, but it doesn't in this slide; am I --

MR. HUNTER: Correct. Yeah, this is --

COMMISSIONER MONAHAN: Okay.

MR. HUNTER: Yeah, this is just the funding for

the initial -- initial investment, but then --

COMMISSIONER MONAHAN: Do you --

MR. HUNTER: -- it kind of accounts for all that.

COMMISSIONER MONAHAN: Got it. One thing we may want to do is, I don't know, it's probably too late for this analysis, but there's a job study that uses real data for EVSE manufacturing -- EVSE installation. It doesn't include the manufacturing side, or any of that, but just the installation side. And I know the fuel cell entries are also doing similar ones using the same, I think, methodology and researchers on the fuel cell side, the hydrogen side. So it will have some data that we could compare this to. That might be helpful. You know it's such --

COMMISSIONER MCALLISTER: Might -- can I did

COMMISSIONER MONAHAN: -- an important --

COMMISSIONER MCALLISTER: Can I interject something here as well?

COMMISSIONER MONAHAN: Yes.

COMMISSIONER MCALLISTER: So, yeah, I was wondering, you know, DOE has taken back the U.S. Energy and Employment Report that was sort of orphaned during the previous administration. And we were involved in kind of keeping it kind of resuscitated and a bunch of states

chipped in. But the U.S. Energy and Employment Report, USEER, and just a few weeks ago for the 2021 version, and I'm wondering if you know about that or it's got a -- it's been going on for about 10 years and has longitudinal, you know, kind of rigger in that way, but it doesn't dig into the details of each sector nearly as much as you have here. But it would be kind of interesting to compare and contrast.

It does break out, you know, transportation sector, including manufacturing. And it does kind of do cover the same territory at some level. And it would be nice to kind of see -- maybe triangulate and sort of compare and contrast the numbers that you're coming up with for this sector with them.

MR. HUNTER: Yeah, I think that's definitely something we'd be very interested in doing. And, Commissioner Monahan, we'd definitely be open to new ideas and ways of improving this analysis moving forward. This was the first year, so we're trying to wrap our heads around an approach to do it, and I definitely think there are some areas to improve on both the data side and the modeling side, so points taken on both those fronts and I think we'll have a lot more to do on this piece. Thank you.

COMMISSIONER MONAHAN: Yeah. And I want to

clarify that this is -- I mean this is really important research, and as we see the federal government finally joining forces with California to invest in zero-emission vehicle infrastructure and to help support, you know, cleaner transportation more broadly, hopefully others will be relying on this, but it's -- as I said in the outset, this is hard. There's no one way, there's no right way, there's only better ways, you know, and kind of improving our analysis to get more information and recognizing that it will always be imperfect, and so you can't -- it's like we can't say, oh, you should -- just because it has the greatest dollar per ton we should do it, because there are so many uncertainties embedded in the analysis that we have to be causative enough. And yet we need this analysis to be able to grant some of our investments and to always be -- again, as a state we need to like really be looking at our own investments and trying continuously to improve our success rate.

You know what's exciting to me and motivating to me is now that California has really said, with the Governor's leadership, that we're moving to a zero-emission vehicle future and we need to make the right investments to get there, it's daunting and exciting. And, you know, this is a huge opportunity in the state of California to show the world how we can clean up our

transportation system while stimulating the economy and creating jobs and creating -- hopefully fostering a more equitable society, so all of those are things that we could really take to heart and we're trying -- you know, I think the entire team at the Energy Commission is motivated to support the Governor's goals. And this analysis is part of that.

So I want to just thank all of you for this research. And I hope you don't take the questions that we're raising as a critique at all. It's more of -- you know, we like you are -- are trying to understand and refine the analysis in investments and improve as we go.

COMMISSIONER MCALLISTER: I want to just step in and thank the NREL team for this as well. I mean it's really amazing. I could not digest all the information that was in the presentation, so I have to go back and revisit and sort through. But not just the NREL team but also the Commission staff.

I mean I can just see how industry players here can look to California and just take heart in the commitment. It's clearly a long-term commitment to get this done. And, you know, acknowledging that we don't know everything we need to know, but I see similar dynamics on the building side where it's very daunting. You know, how do we get into all our building.

And Commissioner Monahan and I are always kind of looking for ways that we can use these two platforms, building and transportation, and sort of mesh them together too to optimize investments overall in the State's clean energy transition. I think there is a ton of opportunity there. You know, certainly home-based charging and business-based charging and that sort of thing through the building codes. But all sorts of synergies in terms of land use planning and local government authorities, and things like that where I think we are just on the -- on the front edge, really, of those efforts, so this has been super enlightening for me. Thank you very much.

COMMISSIONER MONAHAN: One last comment I'd like to make is just -- is it available actually? Further out. But I'd love to read it, but I hope in your report that you clarify like uncertainties. And one of the uncertainties I raised was this consumer adoption, consumer preferences when it comes to light-duty vehicles. Like I feel that that's a really important point to highlight. And the medium- and heavy-duty, that opportunity, because I mean we do see some vehicle attributes in the medium- and heavy-duty, especially with the small owner-operator, you know, they like certain trucks, the way they look. But when it comes to fleets,

like Amazon, they don't care. You know, they're not -- they're looking at just the bottom line. And so some of that, like it's easier to model in the medium- and heavy-duty stage with the fleets and transit districts where there's like a bottom, they just care about the bottom line. And so just a strong recommendation.

And also the fast, they don't really understand how it's inducing compared to the investment that we're making, so just be clear with some of the uncertainties in the analysis that are just inherent. But I think, you know, as a scientist and another researcher, I've seen how people go onto this number and then they say this -- it's this number because, look, the analysis said so, but we all know, analysts, like, oh, no, there's some uncertainty embedded in this and we should just be clear about that.

But with that said, thank you so much. Thank you for being partners and research partners in this. And we look forward to continuing to working with you to improve the data as we learn more.

MR. HUNTER: Great. Yeah. Thanks for the opportunity to present.

MS. RAITT: So --

COMMISSIONER MONAHAN: I think we can turn to Q&A -- oh, sorry, Heather. To you.

MS. RAITT: I was going to say to the NREL

folks: Thank you so much for presenting. If you can hang on for a few minutes, Quentin Gee is going to read some of the questions to get some attendees on the Zoom.

Go ahead, Quentin.

MR. GEE: Okay, great. Can you all hear me?

MS. RAITT: Yup.

MR. GEE: Okay. Great. So, just real quick, we had a brief comment from Tiffany Hoang that we do track this from the SB 1000, so, Patty, if you were asking, and then NREL, we do have some of that data so we'll be able to arrange that for you.

As far as the other questions go, we have one from Jeffrey Lu: Can you clarify how the location of the charger or a fueling station determines the benefits to that location? Is there consideration that drivers may charge to refuel at one place but drive mostly in other areas and, therefore, the air, GHG benefits may accrue primarily in areas away from the refueling station?

I guess, Maddy, do you have an answer for that?

MS. GILLERAN: Yeah. I think it depends, I guess, on the range of the vehicle or I think we assume that most are near the station because the person would have to go to the station first to refuel. They could be traveling on road trips and obviously other things. But I think we were thinking about increasing the radius of

where benefits were occurring in future generations, so maybe like a 30-mile radius for people to drive to the station, the benefits could occur in that 30-mile radius. But like over a hundred miles, people would not like drive to a station, or something. So it's definitely like in the vicinity, but the vicinity can be increased I think to like more than just a census tract in the future.

MR. GEE: Great. Okay. Another question that we have is from Kevin Craig Wood. This might be a little bit different: How do you attribute benefits in cases of multiple investments?

Maybe, Chad, so thinking about CARB, HVIP, CEC, this might kind of get to what Patty was discussing earlier about LCFS. When we do that, do we strictly do the percentage of contribution or is there an alternative way that we could go about it?

MR. HUNTER: Yeah, I think that's come up a couple times a day. It's definitely something we're trying to think through on what is the best approach to allocating those benefits according to funding types. It's -- unfortunately, it's not as easy as just doing a linear or percent of money contributed to the project, according to each of those investment streams. So we're looking through different methodologies in ways of tackling that problem in the future, but thus far we have

basically just said here are the projects that are funded and supported through CTP investment and these are the benefits that accruing to them, and we don't really get into accounting for different funding mechanisms to support these projects yet.

MR. GEE: Great. Okay. Thank you very much.

I think that's all we have for the questions to be answered.

MS. RAITT: Great. Thank you, Quentin.

So, Commissioners, if it's okay with you, we'll move on to public comment. Do either of you have any comments?

So we have Dorothy Murimi from the Public Advisor's Office available to help manage the public comments.

Go ahead, Dorothy.

MS. MURIMI: Thank you, Heather.

So some instructions for everyone: So public comments will go as follows: one person for organization may give a comment. And comments are limited to one and a half minutes per speaker. And so I'll start with folks on Zoom and then move on to folks on the phone.

So folks on Zoom, if you'd like to indicate that you'd like to make a comment, use the raised hand feature. It looks like a high five. And folks that are on the

phone, press star 9 or dial star 9 to raise your hand.

We'll start with folks on the phone -- sorry -- folks on Zoom. That is Robert Perry.

Robert Perry, apologies if I misstated your name. Please state your name, your affiliation, and give your comment.

MR. PERRY: Yeah. Hi. Can you hear me?

MS. MURIMI: Yes, we can.

MR. PERRY: Okay, great. Thank you. My name is Robert Perry. I'm with the consulting firm Synergistic Solutions. And I'd just like to make a comment kind of in support of and following up on Commissioner Monahan's observations concerning consumer adoption. I really think that consumer adoption is really what's going to drive the Clean Transportation Program. And so it's really important to be able to develop a strategy and a story that gives comfort to consumers that will induce them to buy an EV.

And, you know, while there's currently a lot of data concerning light-duty vehicles, it's going to be the transition to medium- and heavy-duty vehicles that's really going to open the flood gates because I think we're all aware of the effusive response to Ford's announcements of the F150 Lightening truck. This is America, America loves their trucks, they love their SUVs, they love their

RVs. And they like to be able to think that they go on trips and not have to suffer inconvenience.

So I think it would be really important to think hard about co-locating high-volume, high-capacity refueling stations next to utility-scale renewable generation. One example would be Kettleman Hills. There's like a massive solar facility being developed there and it would just make sense to site -- Kettleman Hills is also a fueling stop, and just to site a station there, and that would give comfort to consumers and move that along. I am out of time. Thank you.

MS. MURIMI: Thank you, Robert.

Next we will move on to J. Lu. Apologies if I misstated your name. Please state your name, your affiliation, and give your comment.

MS. LU: Hi. My name is Jennifer Lu, representing SoCalGas. Can you hear me?

MS. MURIMI: Yes, we can, Jennifer.

MS. LU: Okay. Thank you.

First I want to say thank you to the Commissioners Monahan and McAllister for putting this workshop together and to the CEC staff and panelists and the NREL staff for doing the benefit analysis.

At a recent discussion with Governor Newsom, Dr Remenetha (phonetic) from the University of California

argued that addressing short-lived climate pollutants must be an active greenhouse gas emissions reduction strategy, to have a chance at meeting global temperature targets. To be successful in addressing climate change head on, California must utilize the technologies we have now to bring down short-lived climate pollutants quickly, such as CARB's SLCP reduction strategy, which identifies biomethane capture and utilization for transportation.

Clean fuels like renewable and natural gas are vital for California to reach its decarbonization goals. Since April of 2019, SoCalGas has supported the RNG market by dispensing 100-percent renewable natural gas at all utility-owned refueling stations. CARB LCFS reporting showed that by the end of 2019, 98 percent of all natural gas used in motor vehicles was RNG. Furthermore, in September 2020, the RNG procured and dispensed at utility-owned refueling stations was deemed carbon negative. This goes well beyond carbon neutrality by eliminating greenhouse gases and short-lived climate pollutants that otherwise would have naturally occurred.

Thank you for the opportunity to make comments.

MS. MURIMI: Thank you, Jennifer.

I see one more raised hand. Michael Skvarla. You are unmuted. Please state your name, affiliation, and you may begin your comment.

MR. SKVARLA: Yeah. Thank you. Mikhael Skvarla with the Gualco Group, here on behalf of the California Hydrogen Coalition. I just wanted to thank the Commissioners, staff, and NREL for providing all of this data. And we look forward to taking a deeper dive into this, as I'm sure everyone else on the line does.

Whoa. I'm sorry. I think I just lost contact. Are you guys still there?

MR. HUNTER: We can hear you.

MS. MURIMI: Yes, we can hear you.

MR. SKVARLA: Sorry about that. Ear pods died and it's been a long hearing.

Again, we just appreciate the opportunity to dive into this data a little bit deeper and get a better sense of what's going on. It's clear that zero-emission vehicles are the future. And we look forward to building that future with the CEC and State of California. Thank you.

MS. MURIMI: Thank you, Mikhael.

I'm going to give another opportunity for people on Zoom to raise your hands.

Seeing no call-in users, again looks like a high five feature. Seeing no more raised hands, Commissioner McAllister, I will hand the virtual mic back to you.

COMMISSIONER MCALLISTER: Well, great, thank

you, Dorothy. Really appreciate your managing the public comment today and in all the workshops, so thank you for that.

I think we're done. Now I would maybe prompt Commissioner Monahan for any wrap-up comments, but I've learned a ton, lots of food for thought, and really appreciate the staff again just for -- I mean the rapid fire presentation of our program and everything that's going on at the Commission, it just gives a lot of comfort and sort of security that when we do get these huge infusion of resources that we know what we're doing with them and we can inject them into the right places in the economy and really hold the right levers and get the most bang for our buck in terms of working with stakeholders and developing technology and just the whole chain of activity in this sector. So it's great to know we have that expertise both inhouse and access to it in NREL and other partners out there.

And it's also just always wonderful, so now that I work directly with the R&D team and also on the path there's a lot of kind of overlap synergy between the electric and natural gas R&D that we do in the transportation sector, and you can just see that playing out here in today's workshop. So really, really heartening and very optimistic going forward. So with

that, I will pass it over to Commissioner Monahan.

COMMISSIONER MONAHAN: Thanks, Commissioner McAllister. Yes, thanks to the team at the Fuel and Transportation Division and at NREL for their presentations today.

You know as you saw, the NREL data we're able to analyze, with less than a billion dollars and we are getting some perspective in the latest budget, we have been allocated $1.165 billion in addition to the current funds that we have, about a hundred million dollars per year through 2023 for the Clean Transportation Program. So we're going to be really focused on supplying those resources as effectively and quickly as possible, and meet the analysis, and the thinking that has gone on with the Fuels and Transportation Division in terms of evolving for them, really becoming more attentive to equity and to ensuring disadvantaged and low-income communities benefit from our investments them, are all going to feed into how the Division allocates the funds going forward. So it's an exciting time really in terms of moving forward an opportunity to accelerate the zero-emission transportation class in the state of California.

And the Energy Commission in collaboration with the Air Resources Board, the CPUC, other state agencies, you know, we're going to work hard to make sure California

can reach its goals and that we spend or fund wisely, ground on this data.

So just thanks to everybody for today. I really appreciated it.

COMMISSIONER MCALLISTER: So over to you, Heather, to close out.

MS. RAITT: I think we covered everything on the slide, how to submit comments, and they are due on August 13th. Again, I misspoke at the beginning of this, but, yes, August 13th is when we request written comments. And that's it. So have a great rest of your Friday.

COMMISSIONER MCALLISTER: Thanks, Heather. Thanks, IEPR team. Really appreciate it. Well done.

(Whereupon, the Workshop was adjourned at 2:29 o'clock p.m.)

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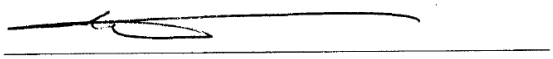

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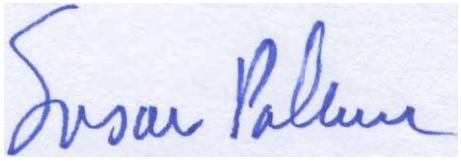

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