INTEGRATED ENERGY POLICY REPORT STAFF WORKSHOP

BEFORE THE

CALIFORNIA ENERGY RESOURCES CONSERVATION

AND DEVELOPMENT COMMISSION

In the Matter of:	)	
	)	Docket No.
2010-2011 Investment Plan for the Alternative and Renewable Fuel and Vehicle Technology Program	)	09-ALT-1

ELECTRIC DRIVE VEHICLES INFRASTRUCTURE

STAFF WORKSHOP FOR THE 2010-2011 INVESTMENT PLAN

CALIFORNIA PUBLIC UTILITIES COMMISSION AUDITORIUM

505 VAN NESS AVENUE

SAN FRANCISCO, CALIFORNIA

MONDAY, OCTOBER 12, 2009

9:00 A.M.

Reported by:
Phillip John Gioe

ORIGINAL

CALIFORNIA REPORTING, LLC
52 LONGWOOD DRIVE
SAN RAFAEL, CA 94901
415-457-4417

APPEARANCES

Leslie Baroody, AB 118 Investment Plan Project Manager

Peter Ward, Energy Commission Staff

Charles Smith, Assistant Program manager

John Margolis, Electric Vehicle Expert

Miles Robert, WebEx Coordinator

Commissioner Rachelle Chong, California Public Utilities Commission

Tim Olson, Energy Commission

Ysbrand van der Werf, Energy Commission

Richard Lowenthal, Coloumb

Sven Thesen, A Better Place

David Packerd, ClipperCreek

Sandor Shapery, Innovative Transportation Systems Corporation

Jon Gustafson, Cascade Sierra Solutions

Larry Hayashigawa, Aerovironment

Colin Read, ECOtality

Mark Aubry, Smith Electric Vehicles

Bob Hayden, Bay Area Electric Vehicle Corridor Program

David Worthington, Sonoma County

Mark Duvall, Electric Power Research Institute

Saul Zambrano, Director, Clean Air Transportation Dept.

Southern California Edison Company

Jeffrey Reed, San Diego Gas & Electric Company

Bill Boyce, Sacramento Municipal Utility District

I n d e x

P R O C E E D I N G S

9:00 A.M.

MS. BAROODY: Well, good morning everybody, sorry for the late start, it's just great to see you all here. Welcome to the Energy Commission's fifth in a series of workshops for the 2010-2011 Alternative and Renewable Fuel and Vehicle Technology Investment Plan.

We'd like to thank the California Public Utilities Commission for the use of this auditorium.

We really appreciate you taking the time to be here with us today and we welcome those of you listening online. We realize that this is a holiday for some of you, so appreciate your effort to be here.

Well, we've had some very successful and informative workshops in the past month and I really suspect today will be productive as well.

I'd like to introduce our team from the Emerging Fields and Technology Office of the Fuels and Transportation Division.

I'm Leslie Baroody, I'm Project Manager for the AB 118 Investment Plan.

And Charles Smith, Assistant Project Manager.

Peter Ward and Tim Olson, they authored last year's investment plan and they're experts on alternative transportation fuels and technologies.

Ysbrand van der Werf, he's our electric infrastructure. Oh, is he here? No, he's not here yet. Anyway, he's our GRET model expert and electric infrastructure expert.

John Margolis is our electric field -- electric vehicle expert.

And Charles Smith and Miles Robert will be assisting us today with the WebEx and the Power Point presentation.

So this meeting is on WebEx and the transcript and audio will be posted online, it will be online for a long time.

Well, the main purpose of today's workshop is for the Energy Commission staff to acquire information needed to provide the basis for allocating $100 million in AB 118 funds. We need updated information and insights on electric charge infrastructure, including technology status, installation location, capital costs, customer demand, market potential and the role of utilities with regard to electric drive transportation.

This workshop is the beginning of a data collection process. We will continue with a review of docketed materials, subsequent dialogue and additional input.

As you can see, we have a full agenda today, we

have ten panelists to speak this morning. We want to allow time, also, for public comments for those in the audience and on WebEx.

Our introductory speakers will be Peter Ward, who will provide an overview of the AB 118 Investment Plan process and we'd like to also welcome CPUC Commissioner Chong, she'll provide an overview of the CPUC's OIR.

A little bit later then we'll have our Infrastructure and Vehicle Charging Panel. We're going to try to break for lunch at 12:30.

After lunch, at 1:30, we'll resume with the Utilities Panel, followed by the public comment session at 3:30, and if all goes well we should be adjourning by four o'clock.

As I mentioned before, this is the fifth in a series of workshops that we've conducted over the last month. This slide here shows the workshops that we have conducted, electric drive, biofuels, natural gas, propane, hydrogen, and then today's workshop.

So the next step in this investment plan process is for staff to analyze and incorporate all the information that we've gathered at these workshops.

We plan to produce a draft of the investment plan just in time for our first Advisory Committee meeting, which should be in mid-November.

We'll then have two more public workshops for the draft investment plan, followed by another Advisory Committee meeting in December. And we hope to have the final draft probably in January.

So if you're not already on our list serve, I encourage you to sign up on our webpage. It's on the bottom right-hand corner, under AB 118 Investment Plan.

So thank you very much and I'd like to introduce Peter Ward.

MR. WARD: Good morning everybody, thank you for coming.

As Leslie said, this is the fifth in a series of five workshops we're having for the next year's investment plan and we're here serving two purposes; this is an awfully nice meeting room, but it's also very germane to the proceedings that the CPUC is holding on this topic, and so we thought it might be best to come right to this point to bring this issue to everyone since we're working on it and the PUC is working on it.

We're happy that you're all here. Also want to say hello to everybody who's on the WebEx out there and we're not forgetting you. You're not in the room, but we definitely appreciate you attending as well.

This year's investment plan will be a little different from the last one. The first one we did was

pretty much groundbreaking, that was the first one. This one will be more of an update from that investment plan last year, and we have quite a schedule to meet; both at the same time we are doing this investment plan we are preparing solicitations that will be going out quite soon and I will be speaking a little more about that later.

This is California, after all, the nation State of California. I think I would be remiss if I didn't point out how big of an issue this is by virtue of the size of our State, 36, nearly 37 million people, a GDP of 1.8 trillion. You know, we're nearing the eighth largest economy.

(Off-record conversation regarding WebEx.)

MR. WARD: Okay, I think we're all set to go again. Along with all the good things of --

(Off-record conversation regarding WebEx.)

MR. WARD: As I was saying, California is a very big state and it has very -- we have a very big problem, or a few, but those are opportunities; right?

So when we're the eighth largest economy, depending on the inclination of the French, we're the seventh, or eighth or ninth, but nevertheless as a State that's very large. We have about 7.2 percent -- this is good, we're having commercials, too. Information on solar, another number.

(Laughter.)

MR. WARD: Our problem for California, in GHG, is relative to our large economy as well. We have 7.2 percent of U.S. emissions, we're the largest emitter on a global scale and transportation accounts for 38 percent of all the GHG emissions in California.

Transportation is key in the nation, it's a little bit different representation insofar as our grid is a little bit cleaner than the national grid on average, so most our GHG comes from transportation and not from electricity generation.

We have 26 million vehicles -- or 26 million cars and about a million trucks on the road. Our annual fuel consumption which, to me, has always been a staggering number, about 20 billion gallons a year, that's over a billion and a half gallons a month and many other states are, you know, one-tenth of that.

We have 16 billion gallons of gasoline, four billion gallons of diesel, and we're the third largest consumer of vehicle fuels after China and the U.S., respectively, so we take our -- we take our spot as a nation state.

In December 2007 the Air Resources Board and the Energy Commission adopted the Alternative Fuels Plan which put into effect our capability of being able to meet the goals that were established in AB 2076, reducing

California's petroleum dependency.

We called for in that a 20 percent reduction -- or a 15 percent reduction in petroleum reduction, 20 percent use of alternative fuels in 2020, 30 percent in 2030. And in this plan we found that under a moderate development scenario we could meet those, and we further delineated those goals to nine percent in 2012, 11 percent in 2017, and 26 percent in 2022.

The principal author for the Alternative Fuels Plan was Tim Olson, he's up at the dias and he can, believe me, answer any questions you might have on that. He was -- did a very deep dive in that and it's an excellent piece of work and charts our future for displacing petroleum as we go forward.

Obviously, this program can have a dramatic effect on how we actually do that. We set the goals under a moderate development scenario and with this program that we're about today is providing the funding to achieve those goals.

We know that electric drive vehicles can make an important contribution to this goal, corresponding reductions of GHG and the air pollution.

Key policy objectives here are GHG reduction, that is the main purpose, established by statute, of our program to reduce GHG emission to 1990 levels by 2020, as called for

in AB 32, and 80 percent below 1990 levels by the year 2050, as called for in the Executive Order by Governor Schwarzenegger.

Petroleum reduction, as I mentioned, reduce 15 percent below 2003 levels by 2020.

Alternative fuels, increase to 20 percent of on-road fuel demand by 2020, 30 percent by 2030. Those are very aggressive goals. Did a calculation a year or two ago and that would be adding about one million gallons of alternative fuels per day into commerce in California. I think we are a little bit behind our track for that right now so, hopefully, this program will help us catch up.

Biofuels use, established in the Bioenergy Action Plan and the Executive Order by the Governor, to increase biofuels use to one billion gasoline gallon equivalents by next year, and 1.6 billion gasoline gallon equivalents by 2020, two billion by 2050.

Also part of that, of those goals is to have those biofuels produced in California at 20 percent of biofuels by 2020 -- by 2010, 40 by 2020, and 75 percent by 2050.

Those are all the key policy objectives and drivers for this bill and for our program, and we think that the funding that we receive gives us a good jump start to achieve these.

For every dollar we spend in this program we can,

I feel, improve many public benefits at the same time and with the same dollar.

The Alternative and Renewable Fuel and Vehicle Technology Program was established by Assembly Bill 118, by then Speaker Fabian Nunez, subsequently amended by AB 109, also by Speaker Nunez.

And here is the emphasis of the program and the purpose is to help us develop and deploy innovative technologies that transform California's fuels and vehicle types to help attain the State's climate change policies.

The funding for the program is up to $100 million per year for seven and a half years; $75 million as allocated in '08-'09, $101 million for '09-'10, and this next year we're thinking the amount could be about $100 million, we're hoping.

We're also -- we've been hoping to capture the funding that was not allocated in the early years to bring it into the third year.

This is to develop, produce, manufacture and deploy alternative renewable fuels, advanced technologies, vehicle efficiency improvements for on-road and non-road applications.

Establish workforce training and job creation, foster education, promotion and technology centers of excellence.

And throughout this we'll be preparing environmental, market and technology assessments as we go to make sure that this program is informed year to year, so we can actually make the best decisions going forward from the allocations of our funding, and so that we're leaning forward for the next best things in transportation that develop.

State and Federal policies to reduce GHGs will increase demand for alternative fuels. As I mentioned, AB 32 and its goals, the California low carbon fuel standard, that's a ten percent reduction, carbon intensity of transportation fuels by the year 2020.

We feel that many of the alternative fuels, if not all of the alternative fuels deployed are around, at minimum, 20 percent lower carbon right now, early, and surplus, too, the regulation's taking effect in a gradual manner from 2010 onto to 2020.

And, of course, the Fuels Standards I and II will have an effect on our program and we're hoping that developing more -- less carbon-intensive supplies of ethanol will be key to that program as well.

First investment plan allocations, this is for the two years, as you can see. Electric drive, an allocation of 46 million, hydrogen 40, ethanol 12, renewable diesel/biodiesel six, natural gas 43, propane two million,

and the market development and program support at 27 million.

As I mentioned, we do hope to inform this program as we go forward and that both is in the market assessment and the environmental assessment, both for GHG and criteria emissions for all the alternative fuels and for the program as we go forward.

A sizeable amount of that money, the market development program support, has already been allocated to workforce training efforts in California.

Since this program was established and signed into law by the Governor, the importance of economy development has risen to the top; I think we will all agree with that.

We're hoping that this program is an excellent vehicle, pun intended, to provide economic development for the State of California.

Previous electric drive funding allocation summary; this is a breakdown of the, again, 46 million that I mentioned.

Plug-in hybrid electric passenger vehicle retrofits, three and a half million, medium- and heavy-duty hybrid vehicle RD&D ten million, non-road deployment projects for ports and truck stop electrification, 11.5 million, charging stations 12 million, manufacturing facilities and equipment nine million.

That last category is funding that we have that is available and it is real, and we were hoping that we would be able to provide the required match share for the Federal stimulus funding and in that particular category there was $2 billion available from the Department of Energy.

And, unfortunately, we got skunked in that particular category and we received zero funding from the OE in this area. I'd like to say that we are ready, willing and able to work with the manufacturing and production of batteries and vehicle components in California, we think that's a very high priority at the Energy Commission and we'd like to work with those folks who are planning expansions or relocations into California for manufacturing.

Our next steps are the ongoing evaluation of some of the proposals for the Federal economic stimulus, though most of those awards have been announced. The biorefineries has not been and the ARPA-E solicitation has not been announced yet.

So we do have some talk-share letters of intent in those and so we are still evaluating those proposals and are waiting to hear which of those projects we have been awarded funds for California.

And as you know, this is the update of the 2010-2011 Investment Plan and that's the business we're about here today, and will be over the next several months, as

we're hoping to go to draft for this, appoint a new Advisory Committee for our Investment Plan process, which is required by statute, hold at least two public Advisory Committee meetings on this next investment plan and, hopefully, adopt it in the spring and take it into the budget season, which is always an interesting, if unpredictable process in California.

So I want to thank you all again for attending and look forward to all the interaction, discussion, and your ideas, which is basically why we're here, we want to hear from all of you if we can.

Our docket is open until the end of -- near the end of this month and when you submit to the docket we do read it, we do take it to heart.

So thanks again for coming, we look forward to productive day today. Thank you.

(Applause.)

MS. BAROODY: Thank you, Peter. Now I'd like to welcome Commissioner Chong.

COMMISSIONER CHONG: Okay. So welcome to San Francisco and on behalf of the Public Utilities Commission, we are very happy to host the room for this excellent event.

I do apologize that I have been called away elsewhere, otherwise I would have been here all day. I'm very sorry to miss the rest of the day, but I have left Matt

Crosby, who is hiding in the corner over there, just wave, Matt. He is the yeoman on the EV proceeding for me and he is going to give me the full report at the end of the day.

So I've been asked to talk quickly about the new rulemaking that the PUC has started on electric- and alternative-fueled vehicles. We put it out on August 20th, and our primary focus is on electric vehicles, but we are looking at natural gas vehicles, too.

And I wanted to just give you a brief overview of the rulemaking and I am going to highlight some areas where I hope that stakeholders, local governments, State agencies, and others can collaborate on.

I would strongly encourage everybody to get involved in our rulemaking, we have a lot of critically important issues that we'll be looking at and I really want everybody to get involved; so please consider it.

So as background, back in May the Commission's Policy and Planning Division issues a white paper on electric transportation, and you've just met the main author, which was Matt Crosby over there.

And then in July, mid-summer, we held just a packed proceeding in this very room, where a number of you were there, on electric vehicles and alternative-fueled vehicles. Really, we had to focus that down electric vehicles.

And it was just a great day, we brought in the automakers, we brought in the utilities, we brought in the independent charging companies, and environmental groups, and electric vehicle owners. And I think what we ended up with was a very -- a great mix of opinions and a lot of substantive information from which this Commission learned a lot. So I wanted to thank everybody that came.

And so we have a lot of momentum going here at the PUC. I'm pushing that momentum because I think this issue is extraordinarily urgent. I think California can take the lead in this area, we have taken the lead and we need to take the lead again.

And so under the leadership of Mike Peevey and myself there's a lot of action here at the PUC pushing forward as quickly as we can.

Now, the thing that impressed me the most from all of these activities is the idea that EVs are coming really soon. I didn't know before the July workshop how many electric vehicle models are headed to our roads and easily there's 10 to 15 that are expected to enter the California market by 2015.

And frankly, there's an expectation that California, and particularly the Bay Area, may well be the launching grounds for these vehicles because we are a place that's very concerned about the environment and we have all

these regulatory and legal mandates that were so nicely reviewed by Peter, prior to me.

So we are also concerned, of course, here at the PUC about the amount of greenhouse gas emissions that are caused by non-electric vehicles, fossil fuel, and so we are also working on reducing emissions generally, along with our other colleagues and State agencies because of AB 32, so we're worried about that.

The other more specific issue is that electric vehicles represent, can represent a significant load for the electric grid and it's been pointed out to us in the workshop that when you have a cluster of electric vehicles in a neighborhood that it can represent a lot of strain on a particular transformer. So we have concerns about what will happen to the distribution infrastructure, in particular neighborhoods where you see clusters, and you do see clusters.

We had one fellow come in and show us that there's clusters in places like Berkeley, San Francisco, Marin, you know, no big surprise there.

But this is a real problem so we do need to make sure that our distribution infrastructure is ready for the additional load that will be posed by electrical vehicles.

It is extremely important that there are no adverse impacts on the grid. No one is happy when the power

goes out.

So there's a big potential for alternative vehicles to cut greenhouse gas emissions and we have to manage the impact of these vehicles on our electric system and this is why the PUC started our rulemaking.

The next two slides is going to give you a taste of some of the issues that the PUC is going to be looking at. More detail can be found in our Order Instituting Rulemaking, which we call an OIR, just to introduce you to the acronyms over here.

Well, obviously, EVs are not going to be successful unless people can easily refuel them and it has to be very convenient for them. So we need to have charging infrastructure not only at home, which is the most convenient place for them to charge, but also at their workplace, which is the second most convenient place for them to charge.

And also it's been pointed out to me that you need to have a fair number of charging infrastructure out in public because of the range anxiety that people feel. In fact, we had a couple of executives from Tokyo Electric Power Company come a couple weeks ago and meet with the Gov-to-Gov Group and the PUC, and he made this point very firmly that until they had put out more public charging infrastructure points for his workers, who were driving

electric vehicles, he couldn't get them to drive very far. But as soon as he put out more of them suddenly they were driving all over the place. And so I think it's a psychological impact of having those out there and I thought that was very, very interesting.

So we are looking into some issues relating to development of infrastructure including the role of utilities and third-party charging infrastructure developers.

We also have to make sure that we have the appropriate rates in place. If owners charge their electric vehicles on summer afternoons, the utility has to purchase higher-priced power, which are generated by more inefficient power plants and in some cases it could threaten the reliability of the whole electric system.

Conversely, at other times, principally nighttime, power is cheaper and it would obviously be a better time for electric vehicles to be charged for the impact on the grid.

So one way is to give vehicle owners an incentive to charge at the best times through time variant rates, so it would be more expensive to charge in the afternoons and less expensive on nights and weekends, early mornings for example.

So the utilities, they've already got time-of-use rates for electric and natural gas vehicles, and we are

intending to review those rates and see if we need to develop new rates.

We also are looking at whether incentives are appropriate for fueling infrastructure or vehicles. One thing that's important is that we have to set up a level playing field for transportation fuels and technologies. The PUC is also going to be looking into some important legal issues that could affect infrastructure development and rates.

So for example, our third-party electric vehicle service providers, electric companies. How fun will that be?

(Laughter.)

COMMISSIONER CHONG: So there's a couple ways to get involved in our proceeding and, again, I really wish that you would. We had opening comments already due October 5th, but if you missed it, not to worry. You can also look at the comments that were filed and file reply comments, which are due November 6th, so there's still plenty of time.

It is also likely that we're going to be holding some live workshops at the PUC on a few issues.

Matt, I don't think we've scheduled any yet; have we, firmly? Soon. Okay, he says soon. I know they've been looking through my calendar recently so I know it's soon.

We're looking, I think generally, at kind of

December to February; is that my understanding?

Okay, so watch the website page, which I'm about to give you, on the proceeding for announcements of workshops. And the other way you can do it is you can put your e-mail onto our service list, there's an informational service list and one for the parties, to notified of any action in the proceeding.

Matt can help you get on the service list. If you give him your card today and tell him you want to get on, he will happily gather that and get that over to our judge.

So there at the top is our Alternative Fuel Vehicle webpage, where you can track what's going on.

Hey, Matt, we've got to get a better landing site, that's too complicated. Talk to Terry about that, we need something really easy.

And then the three people probably working the most on this here, at the PUC, is myself, Matt, who you just met, and my Senior Energy Advisor, Andy Campbell, who's returning from vacation today otherwise he would have been here, but he's also working a lot on it.

So thank you for having me today and I do apologize that I need to run for my next appointment, but thank you for having me. Take care.

(Applause.)

MS. BAROODY: Okay, I think we need to load up a

few presentations, take about five minutes.

(Off the record.)

MS. BARODY: Here we go. I'd like to introduce Richard Lowenthal, with Coloumb Technologies. Thank you.

MR. LOWENTHAL: How's that? Wow, it worked. Okay, thanks very much.

You know, I wrote this presentation to address your questions, but we'll be here a very long time if I do all that, so I'm going to have to push forward kind of quickly.

(Technical delay.)

MR. LOWENTHAL: Okay, so I'm going to move quickly because I know we're behind. So we started two years ago, we make network charging stations and a suite of software to operate them.

We starting shipping, our first customer was the City of San Jose, we opened our network in San Jose to the public in January of this year.

So we sell charging stations, level I, level IIs, some dual, a lot of dual. We are more focused on charging stations outside the residence, so for apartments and condominiums, for curbside, for places like that. You know, in San Francisco half of the cars park curbside at night, so we want to make sure the people in San Francisco can by EVs.

We are working on a DC charging product, which we

will do by integrating with a supplier of DC charging technology.

But the real focus at Coloumb is more on software than hardware. We have a billing system, we have an AMI integration product, we have Smart Grid integration tools, including demand response, an integration with Grid Point Software, and the ability to implement utility incentive pricing programs.

We have a fleet management product, so that if you own a fleet of EVs, let's say you're Hertz rent-a-car and you want to know when your cars are ready to go, we tell you that. And if when they return the car they don't plug it in, we tell you that, and lots of statistics about the fleet.

Remote station management is a big thing for us, where we are trying to have very high up-time by monitoring all of the stations 24 hours a day. So we always know the health of the station, we report it on your Blackberry. So if before you go to a station and you want to know if it's available, that is somebody's charging or not, and if it's working you find out on your Blackberry before you drive there to plug in.

And then we have driver charging assistance, we found that to be very important. For instance here, in San Francisco, we've got some stations at city hall. The ZIP

car guys are the most fun because there's a new driver every day of EVs, that's never plugged in anything before, apparently, so they frequently call our 800 number on the station and we can operate the station from our data center and things like that.

I did the evil pushing the down button again, I got a -- I could talk about this one for a long time, if you want. That's good. So whatever slide comes up, I'm talking about it.

So we are selling now worldwide. We sell more outside the United States than inside. The breakdown is 37 percent to counties and cities, 39 percent to businesses, 22 percent to utilities, and two percent to automakers. That's because the automakers aren't shipping many cars yet, we expect that to grow. And then we expect the utility segment to grow a lot.

Because ultimately, you know, we see whole countries where the business will be entirely utility business, and then they just use our billing system to charge people by kilowatt hour, whereas in the U.S. most places we're not doing that.

But we expect the utility segment to be our largest customer in the long haul.

I'm going to try the down button. Amazing. So here are some places where we have stations. Of course, a

lot in California, but our biggest single customer is in Amsterdam, the City of Amsterdam has 33 stations there now, they're reordering another 65.

The European countries are a little bit ahead. The Kyoto Protocol has pushed them ahead, much like many of the -- much of the legislation here, AB 32, and low carbon fuel standard is going to do here. They've been working on it a little longer there.

But also we have a lot of business in interesting places like McDonald's, and Apple Computer, Starwood Hotels, Ace Parking, a lot of private business where they're using it primarily as a marketing tool to bring customers in from their competitors.

(Technical difficulties.)

MR. LOWENTHAL: If you want to find these stations you can go onto our website, you can see all of our stations worldwide by going onto our website, and you can see which ones are in use because they're color coded blue on our map when somebody's actually charging, and green if they're available, red if they're broken. We hope for no reds.

In Ireland, as an example, they've decided this is an all utility business, all charging. So yes, they need strong asset management, so we give them all of that.

MS. BAROODY: Excuse me, Richard, would you mind just speaking into the mike so our --

MR. LOWENTHAL: Yes, sorry. I'm sorry.

MS. BAROODY: Thanks.

MR. LOWENTHAL: Was this the next one? I'm asking a lot now for specific slides. Okay, good. Yeah, we've done that one. All right, good, it looks like we're a little better off now.

Okay, so some things we think about EVSE, that is the supply equipment for electric vehicles, we think that they should support level I, because we think electric motor scooters, and motorcycles, and these conversion Prius's, there are a lot of vehicles where level I is adequate and certainly is more available.

You know, the basic rule on all these cars at this point, or all these vehicles is they need to charge in four hours, so they charge while you sleep or work, and for many times level I's adequate.

Must be compliant to UL standards. That's written carefully. You know, we are a little concerned that people should be able to accept any of the national testing labs, which is the letter of the law, but they should all be tested to UL standards.

Other things that we believe in, that everyone should have remote monitoring. You know, the stations that we have out there, basically left over from the trial of ten years ago, many of them don't work, some say most of them

don’t work, but primarily you can’t tell if they’re working until you drive up and plug in. So we believe remote monitoring and maintenance is important.

Talked about some of these other things. We also believe that anybody should be able to charge at any EVSE, so although we have these billing systems we also will charge any vehicle that comes to one of our stations. There’s an 800 number on there, if you want to authorize, you call that 800 number and the station will operate.

We also believe every station should have at least demand response, but further we think that energy forecasting and all that should come back to the utility from the stations.

And we feel very strongly, the bottom one, that a station owner should have the option of charging for use of the station. That’s for places like these businesses where they want to recoup their cost of electricity and maintenance.

The situation where we had with stations of ten years, where there was nobody paying for maintenance, led to a very bad situation ultimately, where they all fell into disrepair.

And so we find that there are a lot of our customers that don’t care about billing, then there are a lot of them that do, where they want to get at least their

cost of maintenance and electricity covered.

You asked about costs. They vary so much. You know, an indoor home station can be a thousand dollars; an outdoor, fancy station can be $4,000. We have ones that have a combination of level I and level II, so it's a little hard to pin it down, and installation varies even more.

We tend to use an average of $5,000 for EVSE and installation in the broad scope of things.

In looking at ways that the CEC may want to provide funding, you may want to do less than the full amount. We've found many of our customers self-install, so you don't really need to cover for the cost of installation always.

Many times the cities use their public works departments to do an installation.

So the CEC may want to go to sort of a match in some cases, where they provide funding for the station, but not the installation, which will stretch the dollars. And in fact we see that many of our customers prefer to do their own installation.

We also think it's a very, it's low-hanging fruit to either go out there and either upgrade or supplement the existing charging infrastructure in California, because the highest cost item, generally speaking, is bringing electricity to the site, and so we'd like to see the CEC

focus there.

So this is our specific proposal. We think every city should have stations. You know, I wasn't able to drive my Mini E here today because my Mini E, in reality, gets about a 90-mile range, and I'm about 50 miles away, and there's no Mini E station, so we'd love to have David Packerd install one here at city hall.

But we really need cities to have stations because in a metropolitan area, like the San Francisco Bay Area, a BEV is nearly useless for getting around town.

So the idea, which is promulgated often, that all you need is home charging, at least for an area like the Bay Area is inaccurate, because I couldn't drive my Mini today, and I drove my V8 Mercedes up here today. So there's my alternative, not good.

So we would like to see every city in the State have stations. We think that will cost the CEC funding process 12 and a half million dollars.

This is basically what we proposed to the DOE and we were turned down, like many projects in California, but we still think it's a good idea.

And we also think that concentrations of EV-readiness only in progressive cities like San Francisco and San Jose, Walnut Creek and others is not the way to go, we think it should be driven more by the public, and the public

wants to be able to buy a car anywhere in California.

So the one, two, three, four, fifth bullet down, most cars will at three kilowatts or six kilowatts, meaning that if you charge your car for an hour, you get 15 or 30 more miles.

There's been a lot of talk about focusing on highways, so it doesn't really work very well for level I and level II charging to focus on highways. We'd much rather see a focus on metropolitan areas where you tend to leave the car for longer than an hour. And who wants to wait at a rest stop for an hour, anyway, on the freeway? So we would like to see more of an urban focus.

We also think, as I think it was Rochelle Chong, Commissioner Chong spoke about, is that the availability and seeing charging infrastructure will indeed, by itself, increase the EV acceptance, consumer acceptance.

And putting them in front of cities, in cities, like in front of city hall here, in San Francisco, we think will have a big impact on people's willingness to buy these cars.

And finally, don't forget the bottom bullet, in San Francisco there are six times as many cars as garages. Most people here cannot buy an EV if we don't have some infrastructure outside the home garage.

Many of those people will -- are happy to park at

work, by the way, or charge at work. So that's the way I charge, I charge exclusively at work, not at home, because it's difficult for me to put an EV level II charging station at my home.

The other area we'd like to see the CEC put some focus is on helping us with readiness. There are three particular issues that we'd like to see a focus on. One is a model ordinance; that is creating an ordinance that cities throughout other jurisdictions, throughout California could adopt, that would allow for one-day installation of EVSE.

When I bought my mini, it took a month to get a charging station in my home, in my home in Santa Barbara, which is a little long.

I mean, I come -- I get this car and I'm all exciting to drive it, and with a mini you can only drive it every other day if you don't have EVSE at home, so that's not so hot.

And so we want to see self-permitting. We basically would like to see a program where the governing agencies, the permitting agencies certify electricians to be able to do permitting and inspection so that they can do all of this in one day. So you buy a car and the next day one of us gives you a call and we go install in your home.

Otherwise, the whole impulse buying of the car market is going to get fouled up by this, so we really think

we need that ordinance.

Another ordinance we think we need is one that mimics what they did in Vancouver, Vancouver, British Columbia, which requires EVSE wiring in all new garages. That will reduce the cost of installation by two-thirds when they do decide to put in a charging station, and cost very little at the time of the construction of the garage.

So we would love to see the CEC fund the development of these ordinances. We're not asking for that money, but we sure would love to have these ordinances.

The third one is to figure out how to allocate space. So I have an apartment building here, in San Francisco, I can't get a charging station anywhere near my apartment building. My apartment building has six units and one garage and it is very difficult for a city to figure out how to allocate a public parking space for EVSE.

So these are three areas where we would love to see a project funded by the CEC to get some ordinances that can be adopted throughout the State.

Growth, we expect California will have 100,000 PEVs by 2012. Each one needs two places to charge; one where you sleep, which is different than the home garage, we believe, and one where you work, and so we're going to need a lot of EVSE in California.

Oh, now I've reached the limit of computer. I

know, there's probably nothing important after this. I don't even know what there is.

So anyway, we would really like to see these model ordinances happening, we think that will be wonderfully effective at growing this market. We would like to see people who want to charge, for people fueling their cars to be able to charge for fueling their cars. We want every station to be able to charge anybody's car. And so I'll charge Sven's car, he'll charge our cars, everybody's happy. I think those are the big points.

Are you done or you think it will work? I got hour glasses. You know, I think that's enough, thanks very much.

MS. BAROODY: Thank you.

(Applause.)

MS. BAROODY: Thank you very much and thanks for your patience.

Do you have any questions for Richard?

MR. OLSON: Yeah, one question, Richard, this is Tim Olson for the record here, on your estimate of 100,000 plug-ins by 2012 --

MR. LOWENTHAL: Right.

MR. OLSON: -- how do you derive that? Is that based on automaker or I guess we want to know more about how you're -- where you're getting information to estimate the

number of stations and how reliable is that data?

MR. LOWENTHAL: I don't think it's tremendously reliable. It's not really our data, it's data that we've borrowed from -- there's a couple of reasonably good reports, there's the Morgan Stanley report of a year ago, that's where that number came from. It talked about 200,000 in the U.S. and we think California will have the first half.

And then there's the Pike Research Report that goes into all of this in some detail.

So we don't actually try to do this. When we look at how to roll out stations, we follow the cars. And everybody needs a place to charge when they're sleeping, we think, and according to UC Davis, 80 percent of people want to charge twice a day. So that's the -- we use 1.8 times the number of cars as the bare minimum. If every station was busy, you want 1.8 times the number of cars. And then cars we've picked up from these industry reports.

MR. OLSON: And you're recommending metropolitan kind of cluster installations. Any preferential areas, regions that you would do things first?

MR. LOWENTHAL: Well, you know, obviously the Bay Area is progressive and getting -- making the Bay Area work would be great. It doesn't matter. I can bring my plug-in Prius anywhere in the Bay Area now because we know where we

can charge those, and you can -- I think you can get by with a Rabbit IV still, because we know where we can charge those, but we need at least that equivalent for J1772 vehicles.

So I would start here. And the same way with L.A., L.A.'s a wonderful area, but you've got the same problem where the distances are relatively big in California, 50 miles is not unusual to drive in a day. I do it most days. Not for my commute, but because the Bay Area is a metropolitan region where we spend our time. So that's what we'd like to see.

But really, we believe every city should have some because it's about enabling people to buy the cars, and it doesn't take very man, three or five in a city is enough to awaken the market, we think.

MR. OLSON: And with your -- your plan is on installing these charge stations, charge points; is there -- will there be a conflict if passenger vehicles -- can passenger vehicles charge at the same point as a truck, or a bus or --

MR. LOWENTHAL: We certainly think so. So our stations now are predominantly two-mode, they'll do either level I or level II, and they can do level II up to basically the peak of 220/80 amps, so that's a pretty good rate for any of these vehicles.

Level III, we're waiting for a standard, or DC charging we're waiting for a standard and we'll see that, too. So we do believe the whole range of vehicles ought to be covered. It's clear that the most emissions can be saved from some of the heavier vehicles, at least the pick-up trucks and up. So we're definitely in favor of accommodating those vehicles.

MR. OLSON: Just to clarify, do you own the real estate and the equipment, what --

MR. LOWENTHAL: No, we sell equipment and we sell these software packages. So our stations are always owned by the landowner.

MR. OLSON: Thank you.

MS. BAROODY: Thank you very much. Peter, do you have any questions?

Okay, are we ready for the next presentation? Great.

I'd like to introduce Sven Thesen from A Better Place.

MR. THESEN: Okay, so A Better Place is founded out of a company that the goal, the objective are ending our oil addiction and we do that --

MS. BAROODY: Sven, I need you to speak right into the mike. Thank you.

MR. THESEN: Where do we use our oil? Because our

goal, as a company, is to end our oil addiction, and it's in the light-duty fleets, primarily, and that's where we're starting first to end this oil addiction and the solution is electric vehicles.

And so we are an electric vehicle services provider and we solve all of those issues associated with getting people out of that gasoline combustion engine into the EV.

What are those barriers? The first one is cost. An electric vehicle is inexpensive or it's cheaper than its gasoline brethren, except of that battery. And The Better Place model, we own the battery. We own and manage that battery.

Just like you wouldn't buy an internal combustion engine care and all the gasoline you'd use for its entire lifetime, you don't need to buy that battery or own that battery, we own that battery and we can maximize its usage so the cost of that battery is less for everyone involved.

The issue of range, that's the second obstacle. We solved that problem by putting in battery switch stations. And the good thing about the battery switch station is because you don't own the battery, you don't care what goes in and goes out, and the battery.

So you go in, you have a hundred-mile range, switch out the battery and off you go for another hundred

miles. So you can go from here to Tahoe, or down to L.A., or wherever you'd like to go.

From a grid perspective, we want to make sure that we don't damage the grid or negatively impact the grid because electric vehicles can do both great things to the grid and bad things. If everyone starts charging at once, we suddenly have a new spike, a new peak, we have to build peaker plants, that's bad.

But when you aggregate and orchestrate all of those vehicles charging, not only can you solve that problem of that new peak, but you can harvest wind power, do ancillary services. There's a whole number of things you can do with EVs. And again, all of this in The Better Place model drives the costs down for the user, to get everybody out of their internal combustion engine vehicles into those EVs.

So our latest news in terms of is this a real business model is that in Frankfurt, in September, we announced with Renault, our leading automobile partner, that we're moving 100,000 fully functional electric vehicles into Denmark and Israel between 2011 and 2016.

My understanding is that at the height of the California EV heyday, late 1990s, early 2000s, there was roughly 5,000 EVs at the time. That is 20 times that number.

Is that right, Craig, five, six thousand?

Twenty times that number into two small countries. That's roughly four percent of the Israel fleet. And if that was California, that would be a million vehicles here if we bring it up to scale, and even more in the U.S.-wide, between now, 2011, and 2016, real EVs to move the country off of oil.

So what do we do? We own the batteries, we also own and operate charge spots, and we're putting them in Israel right now, for exactly the reasons that Richard said, to get people familiar with them. Because we'll be honest, the vehicles have a range of about a hundred miles.

Right now we're driving with internal combustion engine vehicles with 300. So yes, we're cutting the range, just like you do with an EV, but when you have this network of charge stations around the country, where you work, where you sleep, you will charge, you will feel good about it, you won't have this range anxiety.

Again, we're installing them at work, public stations, and in the homes.

The same thing for COP 15, in Copenhagen we're putting in electric vehicle charge stations there, and we'll talk more about that in Demark.

To demonstrate the battery switch station, to show that this was a real function, we got a grant from the

Japanese government and demonstrated it in Yokohama. This demonstration was so successful we're moving in to do Tokyo, to do a taxi fleet there, to put in switchable batteries to show how well they work with the taxi fleet. That should be launched, up and working, you can go drive an electric vehicle with a switchable battery next year.

Anybody go to the Olympics in China? No? Me neither, but the busses that they ran, they were dedicated EV buses with lithium ion batteries and they were all with switchable batteries, and they had similar, exact -- or very similar to The Better Place, where the batteries were moved automatically, put in a rack, quickly charged and then, while it was charging the vehicle was out, its brethren batteries were running those vehicles.

In addition to Frankfurt, we also demonstrated what we call both our in-car services and our grid services. The in-car function is as you're driving to let you know where those charge stations are.

If you're out of your normal drive pattern and say, oh, it looks like you're going to Tahoe, oh, it looks like you're going to L.A., the battery switch station is located here, we'll have a battery teed up for you, you pull in, and the battery is switched out in less than 90 seconds and you're on your way again.

And all this information is relayed to you via the

web, or your cell phone. The fun part is, it actually tells you, for example, it will send you customer service signals like your vehicle's in your driveway, but it's not plugged in. It seems like whoever drove it last didn't plug it in, please go plug it in.

So what do we do in terms of our electric vehicle service equipment? To be honest, it's pretty much standard equipment. Part of me says all of us suppliers here should sort of stand up and do the Can-can, because from a technology perspective we don't offer anything super different. One of our differentiators is that we don't offer a screen or a keyboard, we use a Smart Card to initiate charging and you communicate, again, through the cell phone or the web.

Just like Richard said, the installation cost per unit is what I call a snowflake, that it's very -- due to that specific location -- anyone know what their -- how much electricity gets feed to the house, like if you go to the main panel on your house it says a certain number of amps. We've got people with a 100-amp service, they're going to probably need a new -- maybe even a new drop line to get more service into their house, we have people with 400 amp service that are fine from the get go, but they may want their charge point off in their garage, and their fuse box to run the wiring is half a mile away.

So the cost is variable, but from the actual unit, itself, it's less than $2,000.

From a solution perspective we offer the service of aggregating all of these vehicles. The charging orchestration, so we can time the charging to harvest wind and to enable demand response, although we actually see demand response as not being an issue because not many people, due to the CPUC, are actually going to be charging on-peak. There will be a few, but in terms of demand response not such a bit issue. It's more going to be about doing things at nighttime to minimize the impact to the grid and that's obviously both to the transmission and the distribution.

So it's we help both the vehicle driver in informing them their state of charge, where the charge spots are, where the battery switch stations are, and then also help the utility in making sure we don't negatively -- and not even not negatively, but positively impact the grid.

From a perspective of you guys, what we think you should do, funding is needed in California.

I had some European colleagues say that the United States, if we really want to move EVs that our policies are in the way and they use the term "retarded." We're hampered by the policy we have in place if we really want to go to EVs, and that we have low gas prices.

In Europe and elsewhere, they have high gas prices and they have taxes that promote EVs over the internal combustion engine.

So what do we do to get around that? So we need to think about things. We have already the Federal $7,500 grant is great, but what else can California do? So we need to fund infrastructure to solve this whole petroleum addiction, the big picture.

We're focused on level II charging and the battery switch station, but we see a role for all types of charging.

But if we really want, really want to get off petroleum, we need to solve that issue of long-range driving; how can we go the distance?

Because right now, unfortunately, while level III charging does provide a large number of miles in a relatively short time, it doesn't give that gasoline station experience. It stills takes 45 minutes, and hour to get that hundred miles in charging.

The only way you can get around that -- oh goodness, it's okay -- is to have the battery switch station.

So as part of the task let's make a comprehensive solution for our infrastructure.

Then if you look at it, I like what -- I like Richard's projections. We're a little bit lower than that,

but the point being that we're going to need a lot of EVSC put into the greater Bay Area, and California as a whole, to address all of the EVs that are coming by 2012.

And that, besides keeping open markets and a competitive nature, is really it. Thanks.

MS. BAROODY: Thank you, Sven.

(Applause.)

MS. BAROODY: We have a few questions for you, Sven.

MR. OLSON: Thank you. Sven, this is Tim Olson for the record.

Can you just elaborate, the information you provided on cost, the $2,000, that's for the metering, what is that -- what was that referring to?

MR. THESEN: That refers to the electric vehicle supply equipment, so that includes the metering, the actual box, itself, the J-1772 plug, the box.

MR. OLSON: And can you provide us with information on the battery change-out cost, the switch-station cost?

MR. THESEN: They vary depending on what size we're going to have and how many different batteries we're going to have in there, but roughly less than $2 million.

MR. OLSON: Per installation?

MR. THESEN: Correct.

MR. OLSON: And what are you proposing in terms of -- you're proposing that as a corridor type of -- transportation corridor type of installation?

MR. THESEN: Correct. So eventually we see them dotted from here to L.A., up to Tahoe, Sacramento. So just like we're based on the cell phone model, so just like you started in the major metropolitan areas and worked out, that's how we see it working.

MR. OLSON: What's your -- you have existing relationships with battery manufacturers?

MR. THESEN: We do, A123 and NEC.

MR. OLSON: So one of the things that -- you don't have to answer this here, but I just want to pose this for everybody here. We are considering -- we have a -- Peter raised this point and it's a solicitation upcoming, that's his slide was $9 million for manufacturing. Helping locate manufacturing plants in California, batteries, vehicle component parts, whole vehicles, and we are thinking of attaching a condition to that, that would be something like this; that at some minimum percent of any incentive, whether it's for infrastructure, vehicle rebates, et cetera, has to be connected to some local, locally made product. Haven't decided with that percent number, but that's something that, in essence, we don't just want to be the buyer and the purchaser of the vehicles here and users of it, we also want

to manufacture that, some part of that equipment.

So that's something I'd like you to consider.

MR. LOWENTHAL: If I could just respond to that, as a reminder, when you install a level II EVSE it puts three people to work for a day, two to install it and one to make it, so there will definitely be California jobs from this program.

MR. THESEN: And if you look at the actual cost of the box compared to the cost of the installation, you'll see it's a much higher ratio. While there is manufacturing associated with that box, its cost is not as much as the installation cost, itself.

MR. OLSON: And Sven, could you just clarify, does your company do home recharging, is that in your plans?

MR. THESEN: Absolutely. Absolutely. In Israel, our first country of launch, we see it in more public charging because more people live in apartments, and duplexes, and condos but here it's obviously going to be in the home charging market.

MR. OLSON: Okay, thank you.

MS. BAROODY: Sven, I have a couple questions for you, it's Leslie Baroody, for the record.

I'm just curious, has there been any technical problems with the battery switch out?

MR. THESEN: It's been cycling in Yokohama for

over 2,000 cycles and it wasn't expected as a -- it was just meant to be a demonstration to prove that it works and we haven't had or seen any technological glitches.

Sadly, it's not that actually complicated, it's just a lift and some latching mechanism. Not to belittle the latching mechanism, they can take nine Gs of force. But it's not -- from a physical, technological perspective, it's not that complicated.

Battery chemistry, that's complicated. Physical moving of 500-pound objects is not that complicated.

MS. BAROODY: And how many cars could a station handle at a time, would it be one, one at a time or --

MR. THESEN: So one lane, it takes roughly -- the cycle time, from cleaning the underneath of the car from the time you pull up or just before you pull up, drive in, drive out, we envision as being under five minutes. We can actually do the switching of the battery in less than 90 seconds. We see the process taking roughly five minutes.

MS. BAROODY: Okay, thank you.

Anybody else?

All right, thanks, Sven.

Our next speaker, David Packerd with ClipperCreek.

MR. PACKERD: Call me crazy, but I have a paper copy just in case.

This is basically the same presentation, with a

little tweak, of what I did at the Plug-In Show. For those of you that were there, I apologize for that.

We're ClipperCreek, we're up in Auburn, California. The three founders, Jason France, who's here today, myself, and Mike Rogers were the principals of EVI, the company that was around from '93.

We've shipped over 2,000 EVSEs this year. We're in our 12th generation of product. We currently have three UL-listed products on the market and are currently the only UL-listed products available.

And we're all, as everybody is, waiting for the new connector, which should be coming soon.

And if you notice on the map, most our vendors, in fact all the vendors are California companies. We buy all our products, most of the plastic and metal is done up in Auburn and then all our other vendors are in California.

About the only thing that's not from California in our company is me, I'm from Georgia.

Some of the things we learned last time around, 110 volt charging doesn't work. As Richard said, if you tried to charge a Mini E, you'd only be able to drive it every other day because it takes so long to charge.

And also the standard outlets we have today, I mean, one of the advantages of 110 volt, everyone thinks, is we have charging stations everywhere. But really, the

outlet you buy for 50 cents from Home Depot really isn't cut out to be run at full speed all the time, and plugged in, plugged out, you know, kids yanking on it, whatever, they just don't really cut it.

Plug-in cord connected level II for general public use really doesn't work, it's not safe. The power levels are really too high to be handled every day. We have our dryer plugged in but that's done once every ten years and you trip the breaker before you do it.

Also, with these plugs it's not safe at all to pulling them out while they're charging because you'll get a huge arc, it will be ugly and scare a lot of people.

And basically, in this industry we can't afford one mistake. I mean, it's all or nothing. And if anybody gets hurt, I mean, that's going to be all over the place, we just can't afford that.

And so we feel the EVSE's the way to go, the standard outlet -- standard plug. Luckily, this time all the automakers have agreed on one plug, which is going to make life a whole lot simpler for us.

Some of the locations for charging stations, where do we put them, we had a lot of experience, a lot of mistakes in the past. But, you know, we used to put them right in the front, you'd drive up to the mall, right there in the handicap spots there were EV charging spots, and that

just charged a lot of animosity, a lot of icing they call it, with internal combustion engine cars with parking with there in those spots because nobody was ever parked there or not that much, so people felt entitled to take them.

EVSE's should be put where we minimize the installation cost. We'll talk a little bit about that in a minute, but let's get it close to the service, let's reduce the cost, because we can talk about the cost of the charging station, you know, getting it down -- public charging stations down to a thousand bucks but, really, we can't affect the cost of cutting up concrete and installing, the actual physical labor of installing the charging station, there's no benefit in volume to those.

So really we just need to minimize it by being smarter when we install the charging stations.

And also, proper signage is essential. Let's let people know there's charging stations there, let everybody know there's charging stations, not just the select few that have vehicles, so that everybody can start thinking about electric vehicles, to that note, using it as a sales tool.

And also, you know, what's the big obstacle of driving an electric vehicle; it's range. It seems universal, even people that aren't that involved in the industry seem to know about the range.

And so when you see charging stations everywhere

all of the sudden you realize, hey, if I can plug in everywhere, I'll have the range I need to drive this car everyday and so it starts getting people thinking about it and talking about it, and it starts working as a sales tool and encourages the use.

Also, having a lot of charge stations, if in your mind you think I'll take the EV for short trips and my internal combustion car for long trips, the more charging stations you see, the more trips you realize you can take an electric vehicle with and start using it for more miles to maximize the use of the electric vehicles.

I think we found in the past people bought electric vehicles for their second car, they figured they'd take it out on weekends. Within a year they were using that as their primary car, trying to maximize the use, they're fun to drive.

The real cost, again, installation cost outweighs the cost of the EVSEs, it really can be significant.

The Southern Company did a great job with their installations, they got a cookie cutter approach, they went into the malls, they got as close to the service entrance as they could, they had one transformer set, they ran 12 stations off it and used that same installation everywhere they went. And they got their cost down to about $2,000 per charging station for installation. And for public installs,

that's pretty significant.

And really, what we're trying to focus on is keeping the savings of driving an electric vehicle in the pocket of the driver. Electric vehicles, there's a high initial cost, but after that they're really cheap to drive, they're only about two cents a mile. And the more of that differential we can keep, that two cents to ten, or 15, or 20 cents a mile that the internal combustion engines cost, cars cost to drive, the more of that we can keep in the pocket of the EV driver, the better off we are, the more they're going to drive it, the more they're going to enjoy driving it.

The good news. California has a lot of existing infrastructure, that's the low-hanging fruit that Richard was talking about, that we can go out and install the new standard connector that all the electric vehicles coming to market will have.

There are numerous grants -- well, yeah, there were numerous grants from the Feds, none of them came here. But there are still Federal tax credits that can help offset the cost of installations.

We feel that public infrastructure that's put into CEC money, perhaps should have the requirement that charging is provided for free and maintenance is provided for free.

In reality the electric cost, the kilowatt hour

cost is fairly insignificant when you talk about the cost for a retail job to get somebody in the door.

Again, Southern Company, who did a lot of studies on this, found that the malls were spending about a dollar fifty to get customers in the door, for every customer they got in the door was a dollar fifty.

And what they found with the public infrastructure that they had, that their customers, they knew how far away their average customer was, it was about 10 or 15 miles, and when they drove there the amount of electricity they used was just three or four kilowatt hours, based on how far they lived, they charged at home, they drove to the mall.

So this big fear that, you know, we're going to be running the charging station at six kilowatt hours straight through the day just never panned out, it was very -- the electric cost was very low.

In addition to that, people would come and park there and charge, get their 15 miles back in the first hour, but they'd shop for three hours.

So again, even if everyone came there and needed a charge right then, it took a little while for the turnover. And that's also why, not to belabor this point, but it helps to put charging stations in locations where people are going to be for a few hours.

Not to knock McDonalds but, you know, people

aren't there for very long. I know, I can only stand so many French fries, even my kids won't want to stay there more than a half-hour.

And you want to be installing infrastructure where people know that it's going to be, know that it is, and they're going to be there for a couple of hours so they can get a significant charge.

Residential load, again, you know, all the loads should be handled -- should have load management devices or whatever Smart Grid technology the utilities are rolling out, we should be able to tie into them to ensure that the vehicles are charged only in off-peak hours.

We should also move to some kind of residential managed EVSC, where the resident can actually handle the final steps of the install. Where their house can get prepped by an electrician, they can be ready to buy and electric vehicle and they can go out and buy it, and come home with a charger and handle the final steps of the install themselves.

Also we need to look at creative solutions. I think Sven was talking about limited capacity in your panel. Well, let's look at ways of sharing the load between the dryer, the oven and the EVSE. Because, you know, if you're going to charge at night, you're probably not running your dryer or cooking something in your oven at night, so you can

share that capacity in your panel with all these different loads within the house and save the $10,000 it costs to upgrade the panel in a residence.

Looking at utility load, again, you know, tying into the Smart Grid or the load management, the demand side management that the utility has is needed right in the beginning.

And we talked earlier about, you know, clustering in different neighborhoods, it's vital that we manage that load for the utilities.

Fleets and other installations, again, we can maximize the amount of service that's available by sharing the load among the vehicles because they all don't need to be charged at the same time.

Again, in dual EVSEs, in managing different blocks in a -- you know, like here we manage four different, separate blocks of charging and each of those boxes would charge two separate vehicles, so we'd significantly reduce the service that had to come into that location to charge a fleet.

Just as a conclusion, I think level II's a necessity. Charge stations, public charging stations is an effective way to attract customers, to get people thinking, thinking about electric vehicles, get the market moving.

Installation costs far exceed product costs. I

mean, I think we can -- we've done a good job, at least we feel ClipperCreek, one product fits all right now. We use one product, maybe a few separate modules or feature sets that will work for residential, public infrastructure, fleet, but we need to eventually go to separate products for each of those markets when the volume gets high enough, and all we're trying to do is maximize volume.

Utilities need the ability to control the EVSEs early on.

And we think the industry will provide significant benefits to California, like we talked about earlier.

Getting the manufacturing in California, we have a lot of capacity in the State, we have a lot of smarts in this State and I think we can do this with a lot of California-born companies, and vendors, and suppliers.

Thank you.

(Applause.)

MS. BAROODY: Thank you. Thank you very much.

Are there any questions for David?

MR. OLSON: Yeah, David, Tim Olson. I wonder if you could -- what do you mean by signage, freeway signage, if it's a shopping mall just so you know where the location is in that mall parking lot or what?

MR. PACKERD: Well, you start on the public drives to identify electric vehicles, the charging stations. So

when you're going that you don't have to pull into the mall to know where it is, you know when you see a sign, even coming off the highway, that there's electric vehicle charging there.

MR. OLSON: And on the installation for homeowners, this point you're making about the final installation by the homeowner, would a 200-amp service, would you have to do any kind of an upgrade to the service box; would 200-amp service be suitable for your household use and charging vehicles?

MR. PACKERD: It should be. I mean, you know, that's a lot of power but, you know, some of these houses are pretty big.

But if you look at a -- from my experience, only, from, you know, a 3,000 to 4,000 square foot house, a 200-amp panel should handle everything including a six-kilowatt electric vehicle charge station.

MR. OLSON: And can you make a comment on whether some of these -- the extent that these installations should be cost shared?

So our approach typically is we like to see cost share, particularly if it's a private entity, and we want to reward the early adopters on this and get enough infrastructure in place, but we're looking for a cost share; what's your comment on that?

MR. PACKERD: Well, it --

MR. OLSON: What level that might be, if at all?

MR. PACKERD: Well, I think it depends on -- you know, like some of the criteria that I talked about, if they're willing to provide the electricity for free and provide all the maintenance for the stations, then perhaps they get more cost share. You know, maybe it's up to 75 percent given those criteria and dropping down to 50 percent if you don't want any ties.

But also I think it all has to be, I would think, available to the public.

MR. OLSON: And what's your knowledge, with local governments they don't tend to have a lot of money, what's your feeling about that, if it's a local government installation that's also public access?

MR. PACKERD: Good question. I mean, I think everybody has to have skin in the game or else you don't value and we'll start getting installations that, you know, may not be the best use of the money.

So if there is some -- any amount of money have to be provided, then it makes people think a lot more about it.

MR. OLSON: Okay, thanks a lot.

MS. BAROODY: Any other questions?

Thanks a lot, David.

Okay, next up we have Innovative Transportation

Systems Corporation, Sandor Shapery, is that Shapery?

MR. SHAPERY: Yeah.

MS. BAROODY: Thank you.

MR. SHAPERY: Good morning, I'm Sandy Shapery, President of Innovative Transportation Systems Corporation.

I want to share with you a concept that we've developed in conjunction with General Automics Corporation, AECOM, and my company Innovative Transportation Systems, also working with Southern California Edison.

This is an electric zero emissions container moving system for ports. This system was particularly designed for the Port of Los Angeles and Long Beach.

I'll give you kind of a quick run through of Innovative Transportation Systems, it's one of the Shapery group of companies. We've done everything from working with NASA on vertical takeoff aircraft ducted fan designs to developing, designing, developing and owning for our own account high-rise office buildings, hotels.

I don't know if anybody's been to San Diego, but that's where we're headquartered. The Emerald Shapery Center, a million square feet, built and owned the W Hotel, we own Sempra Energies Corporate Headquarters building in San Diego.

General Automics, our partner, is probably most well-known for developing the Predator, which is kind of our

most effective tool in our war against terrorism right now. They have a lot of other specialties they work on, navy ship electrification, and in fact that's kind of where this concept originated.

They're into fission, nuclear fusion, fission reactors, linear motors, Maglift systems, street car refurbishment and mining trucks.

AECOM is the world's largest engineering and environmental company and in fact they have designed and developed the Alameda Corridor, which is a major transportation system from the ports, assisting in moving containers and freight out of the ports.

This idea originated with military application, where General Automics Corporation has developed a linear motor aircraft launching system for the next class of aircraft carriers. In fact, the first one is going into the Gerald R. Ford that's under construction right now.

And basically it's a linear motor that will take a jet fighter plane, a 78,000 pound fighter plane, and accelerate it from zero to just under 200 miles an hour in about a second and a half.

And because of the fact that they're fighter aircraft, the system has to be failsafe and has great redundancy, so we're confident that our system will have little or no problem.

I approached General Automics several years ago, when I heard about their aircraft launching system and said why can't we use something like this to move train cars, with a zero emissions approach, instead having the overhead catenary wires, and that's kind of where the collaboration began.

The basis of the system is very, very simple, we start out with just some three-phase electric windings, you see on the left of the screen. We encase them in concrete so nobody can be out there stealing the windings. And then they're mounted between the crossties of railroad tracks. The only other element you need now, because we have the electric windings, is we put permanent magnets on the underneath side of some railroad bogies, and with a series of block switches we can then move these railroad bogies wherever we want, whenever we want.

We took the additional idea of for this port container moving system was to just pave the railroad tracks, so they're similar to streetcar tracks, and then we took a fifth wheel, that you find on diesel trucks, installed it on the railroad bogie and we can then put the trailers, and with the containers on them, and move them automatically, autonomously. So this is kind of an illustration of how it works.

Because you can only have one vehicle in a section

at a time, there is virtually no possibility of collision.

Another thing that we're working on also, as part of this system, also involves moving of the container. So right now procedurally, at the ports, at least in the Ports of Los Angeles and Long Beach, and many of the other ports, when they unload the ship the crane puts the container on a trailer, a yard hostler then takes the trailer to a stacking area where it's stacked, catalogued, and at a future date and time is put back onto a trailer and then moved to an intermodal container facility which, in the case of Los Angeles and Long Beach, is about five miles away.

This system that we're proposing will actually eliminate 1.2 million diesel truck trips per year.

From a standpoint of emissions reduction, there's 35,600 tons per year of emissions will be eliminated, just in the San Pedro Bay Ports region.

We'll be converting 1.2 million diesel truck trips per year to a zero emissions container moving system.

From a fuel reduction standpoint, the net savings on a fuel per year will be about $9.2 million.

It starts out that there's a, I believe, 10.6 million in total fuel cost compared to electricity, our electric cost is about 1.6 million per year, so there's a substantial savings just in energy costs.

And in fact that savings energy cost will allow us

actually to reduce the cost of moving containers in the port. Right now the Port of Los Angeles and Long Beach are one of the more expensive ports because they have a number of charges imposed to assist in electrifying trucks and other means of eliminating pollution.

Give you a little information on the technology maturity, linear motors go back over a hundred years when Robert Goddard, who was known as the father of liquid fuel rockets, actually came up with the concept in 1905 when he conceived of, actually it was the first Maglift vehicle using linear motors, in a freshman engineering paper.

Linear motors are currently used in a number of rail systems, the Vancouver Light Rail System, (inaudible) Port Transfer, JFK Air Train, the Detroit People Mover, Scarborough Light Rail in Toronto, and the Shanghai Transrapid System.

The Shanghai Transrapid System is a little different and that’s kind of the design that we’re using, in that the other systems have what they call a shortstater system, which means that the stater part of the motor is on the vehicle. And what that requires then, if you have your motor on your vehicle, you have to get power to it. So in those cases, every case except the Transrapid system, you have to have a hot third rail or some sort of a brush configuration to get your power.

And we just felt that that was just not safe and not a good way to do it.

So using the longstater system we actually energize the motor or the windings in the track. And our vehicle's what they call a dumb vehicle, there's nothing on board but just a set of magnets that will move it.

Or if you use a linear induction motor in your synchronous motor, you can just do it with an aluminum plate instead of magnets.

We chose the linear synchronous motor because it's more efficient and the only difference that you have basically is putting the magnets on it, but it's much more controllable and a much better alternative.

For a container moving system you want to have -- where you have a lot of vehicles, you want to have your vehicle costs very low, and that's one of the reasons also to utilize this system.

The other great advantage is that there's no chance of getting shocked or electrocuted. In other words, you could go up and drive a spike into the motor winding in the railroad track and nothing would happen because that track is only energized when a vehicle is over it.

So if you're standing on the track and driving a nail in there, the only time you'd get electrocuted you're probably going to get hit by the vehicle first, so it's not

likely you're going to get electrocuted.

Hope we can get the animation to work here. This is a -- okay. All right.

Well, this shows the control system and basically it's being used right now, the control system is being used on linear motors for conveyor systems.

I guess their animation's not going to work. Sorry about that. But the animation shows a number of vehicles coming in from different directions and they'll stop and let the other ones go, so it's totally controlled, no chance of collision at all.

And the next slide I'm assuming the animation's not going to work either, but this basically -- oh, here we go, we got one working.

So this is a virtual train where you can basically have -- the vehicles are really not connected and you can, by computer software, send any vehicle to any specific destination that you want.

Basically, the development plan, there's really four phases to it. And again, this is a privately financed project, ultimately privately financed once we get to a certain point.

Phase one is design, build a demonstrator and that's about a 12-month schedule.

Phase two is the design development to permits.

Now, this is where all the detailed engineering work is done, all the civil engineering work is done, the environmental work, and you then get to the point of building permits.

Once all the permits are available, then private financing can be obtained.

Oh, I forgot to mention we've also partnered with Macquarie Bank. Macquarie is the largest infrastructure bank in the world, they're also the largest owners of toll roads. And in fact, they look at this system as kind of a gloried toll road.

Construction will actually take about 30 months for the system. So in order to secure or develop the project, we have to first secure a location for proof of funding for the -- or proof of concept demonstrator, and we're working on that right now.

Obtain partial funding from Federal and/or state grants, with matching funds. We have a tentative commitment from the South Coast Air Quality Management District, CARB is looking at assisting us and, hopefully, the California Energy Commission will step forward with help.

Supplemental match will come from government fundings and private in-kind contributions.

For example, some of the equipment can be donated, we can take credits for that. So these are important

considerations in putting together a privately financed, or public/private finance system.

Then at that point, once we develop the demonstrator and we have working drawings for the permits, and that's basically the phase one funding sources.

Phase two is the design development funding for permits. First, we have to win the RFP to develop this system from the Ports of Los Angeles and Long Beach. Then at that point there are additional possibilities, such as TIFIAA loans, in-kind contributions, which will take us to the detailed design for the operating system.

Initial environmental studies and impacts will be done and then, at the same time, part of this will require developing a community and user outreach program. We have to -- we want to bring in not only the users, but the community to create an advisory committee to make sure that all of the community issues are being addressed.

And then, at that point we have to negotiate a long-term operating contract for the operation of the system.

Incidentally, General Automics, in addition to building this system will also be handling long-term maintenance.

The financing plan basically is financing will be available upon receipt of all the development permits. What

we have to do is determine the operating income and expense, determine the capital cost, develop the financial business plan, and then determine if public sector funding is needed to cover any possible shortfalls. Those are basically the phase three financing plan.

The demonstrator, for preliminary pro forma, our demonstrator costs we expect to spend between eight and ten million dollars, and we would be looking for some public funding and some help in that.

The design development cost, bringing it to permits, would be another 22 million. So we're total pre-development costs of about $30 million.

Now, depending on the cost of -- or depending on the route that we use, we've analyzed some routes that the Port of Long Beach is looking at. We think there are some better possible routes because some of their routes require elevated tracks and that substantially raises the cost.

We believe we can do this project for as low as 10 to 12 million dollars per mile. Using the current proposed alignment that was dictated by the Port of Long Beach, basically we're looking at about $19.5 million per mile in cost.

But when you compare it to the other proposed systems, such as the Maglift system, those run between 50 and 100 million a mile. So when you look at our $468

million it sounds like a lot of money, but when you compare the alternatives, or 1.2 billion to 2.4 billion to solve this problem, it brings the numbers into proper perspective.

This is a proposed alignment plan with seven pickup stations.

And looking at doing an operating numbers, taking the current revenues at $75 a container is the average cost and there are 900,000 containers per year, that's $69 million in gross revenue.

When we looked at the labor cost we did an analysis to about $21 million, energy cost 1.2 million, overhead and profit is 15 percent.

It's difficult to get private companies' interest unless they're going to be making some profit.

So the capital cost of debt service on the 19 and a half million times 24 miles, the 468 million looking at six percent comes in at about 35.5 million a year.

And so at current costs, and if we were to build it today, there would still be 950,000 income available to retire the $30 million pre-development cost.

Now, if we look at the average for 24 years and we discount the cost of moving the containers by 15 percent, in other words, you know, we want to eliminate pollution and reduce operating costs, basically it comes down to the fact that the project gross income after expenses -- I'm sorry,

the gross revenue is 84 and a half million, we take off expenses, we're down to about 49.62 million, we take off our 35.5 million debt service and it produces about $14 million a year in net income. So it is financeable and Macquarie Bank is very interested in doing that.

So that's basically the presentation, are there any questions?

MS. BAROODY: Any questions?

MR. OLSON: Yeah, Sandy, I have a couple questions, this is Tim Olson.

You -- I didn't catch what the status of that RFP was, where is that in the process at this point?

MR. SHAPERY: Right now the Port has put out an RFCS, request for concepts and systems, and we are responding to that. Our submission is due the 25th of this month, we will have that in, they will be analyzing the different proposals coming in and then preparing the RFP sometime next year.

MR. OLSON: And that's they're obtaining the right-of-way for that. Is that, in essence, a rail line, is that how they describe it?

MR. SHAPERY: Well, the RFCS is rather open, it's not limited to a particular type of technology. So ours is using a rail system, others may be using magnetic levitation, others may be using roadways. So it's rather

open right now and I think that's why they went in with the RFCS approach initially, to find out, okay, what are all the concepts.

And as I say, there is so much existing rail track there that some of it's used, some of it's unused. Our engineering firm, AECOM, who built the Alameda Corridor, is very familiar and they believe that we can actually bring in using a lot of the existing rail and reduce the cost substantially, possibly by as much as half.

MR. OLSON: And is that, just for kind of going into a little more detail on the location, is that location from Port of Long Beach to -- there's a kind of a distribution point about five miles away from that; can you just elaborate on that a little bit?

MR. SHAPERY: Yes. The way the procedure works is all the containers or most of the containers ultimately end up at the intermodal container transfer facility. Now, that is operated by Union Pacific. They're planning also on building along the way -- in fact, the intermodal container facility, if you see that blue line, ICTF, that's where it ultimately goes to and that's about a five-mile difference from the port's loading stations.

MR. OLSON: Is that along the 710 corridor there?

MR. SHAPERY: It's not. That's proposed along the Dominguez Channel and through the port.

MR. OLSON: Oh.

MR. SHAPERY: There is some -- there are proposals to develop the 710 corridor for truck traffic and, in fact, this same linear motor concept can work in the 710 corridor to move trucks, the same as it can move these rail cars.

MR. OLSON: And is there proprietary technology in this that --

MR. SHAPERY: Yes, there is. The proprietary technology, we have several. One is -- well, linear motors have been around for many, many years, so we could not protect that. But the idea of coupling the trucking facility, where we can actually hook containers onto our bogies are protected.

And then we also have a collection station system which is rather unique, and we have that protected also.

I was going to put a slide in here, in fact we just got our preliminary patent filed the other day but, unfortunately, I didn't -- I noticed the slide's not in here and I forgot to put it in, so I apologize for that.

MR. OLSON: And then the amount of money the Port of Long Beach -- is it the Port of Long Beach or Port of Long Beach and L.A.?

MR. SHAPERY: Yes, Port of Long Beach. And in fact it's going to be -- the proposal program will be ultimately taken over by the Alameda Corridor Transportation

Authority.

MR. OLSON: Are they -- how much money did they set aside, their own money for that project?

MR. SHAPERY: Our understanding is they set aside nothing, so they're looking for privately-funded proposals.

MR. OLSON: And South Coast, the same thing?

MR. SHAPERY: South Coast has indicated a willingness to put some funds up for this project, yes.

MR. OLSON: And what's the time frame when they're going to give you a decision on that concept?

MR. SHAPERY: I don't recall, but I believe it's going to be sometime next year.

MR. OLSON: Okay. All right, thank you.

MR. SHAPERY: Thank you.

MS. BAROODY: Okay, thank you very much, Mr. Shapery.

(Applause.)

MS. BAROODY: Okay, we're going to keep rolling here so we can keep up with our schedule.

Next we have John Gustafson with Cascade Sierra.

MR. GUSTAFSON: Good morning, you've heard about vehicle technologies and now you've heard a discussion of some of the infrastructure work on the hybrid rail, and rail trailer technology.

We're going to now turn our attention to the

segment of heavy trucking and the infrastructure for heavy trucking that runs on the interstate corridors.

I'm with Cascade Sierra Solutions, we're a nonprofit company originally formed in Oregon, but now working on the I-5 corridor.

What we do is we identify clean technologies and transportation applications and these applications are intended to improve air quality and the slow climate change.

What we do is, as a nonprofit we work with government agencies, the equipment manufacturers, the trucking companies, and financial institutions to put together innovative financing partnerships that can solve the capital access problem that truckers have.

Our role is to gather the technologies, the grants, the tax credits, the rebates, rules, et cetera and make those available to the trucking industry.

The trucking industry would be your carriers and also your truck stops.

We're currently operating on the I-5 corridor, serving primarily the over-the-road trucking community. As was explained earlier, there's about a million trucks operating -- excuse me, three million trucks operating in California. About a hundred thousand of those trucks are over-the-road trucks, and at any one time 20 percent of those trucks are from out of state. The 20 percent out-of-

state trucks rotates about every four days, so you have a fresh batch of over-the-road trucks.

But as you see we're currently operating in Seattle, and in Portland, and in Eugene, Oregon.

We have an outreach center in Sacramento and we're soon to have an outreach center in Los Angeles. We have people on the ground in each of those locations.

The outreach center essentially is a facility about twice the size of this room that gathers all the relevant technologies that truck owner or operator might like to see, that he could put onto his truck. And then in that center also we have deployed all the capital incentive programs that that truck operator can take advantage of to purchase that equipment.

So now let's turn to truck stop electrification. Over a hundred thousand heavy-duty trucks operate on the West Coast and this group's movement is projected to grow 70 percent by 2020.

The principal opportunity for fuel savings and for emissions reductions is to eliminate the idling component of those trucks. Now, as you know, every truck that's over the road is required to stop for ten hours after operating for 14 hours, and that's called a required rest period.

The opportunity for public incentive is to help the truck operator get out of idling his diesel engine.

That's about a gallon to a gallon and a half per hour for that ten-hour period of time.

What we feel is that truck stop electrification should be built by the private fleets, at the private fleet locations and the commercial truck stops along the primary routes, and those routes are identified primarily as the interstate highway system.

This is required -- this is awfully important for California because so much of California's agricultural and industrial base is tied to distributing goods elsewhere across the nation. About half of the states now have no-idle rules and so the truck drivers are being forced to look to alternatives to idling the truck.

We've proposed to Department of Energy a $22 million grant program from the Department of Energy, with match and then private sources, total project value of about $68 million, to install 50 truck stops on the interstate freeways across the United States.

The 50 truck stops would each deploy about 30 power pedestals and we would deploy those power pedestals along the routes that are most heavily utilized by trucks that travel to and from California.

About 60 percent of the grant funds that we've proposed to DOE would actually provide the owners of the trucks to buy the equipment that will go on their truck to

attach to the pedestals, and then also to assist getting in the other kinds of equipment, the HVAC systems, and the various kinds of things that actually make a truck suitable for power pedestal use.

With these 50 truck stops, we would eliminate about 36 million gallons of fuel, 370,000 tons of CO2, 140,000 tons of use of particulate matter, and 7,000 tons of nox in a ten-year period.

In order to proceed with this project half of the -- there's two challenges that we face. The first half is to get the infrastructure on the trucks and on the freeway, in the truck stops, but then the other half of the challenge is to actually convincing the truck industry to change over to these alternative fuels and change over to stopping their trucks at truck stops. And so there's a heavy component of the project that's devoted to promotion.

What we are lacking in our proposal so far, which has been accepted by DOE, is getting about two and a half million dollars worth of match.

And what we would like to propose in the AB 118 Investment Plan for next year is for California to step up with about $2.5 million to support the ten truck stops that we've planned to put into California.

A studied alternative then is to study to see exactly what the optimum number of truck stops in California

might be. We don't know what that might be, it depends upon industry acceptance of the technology and the way the industry takes off, but it could be as high as 100 truck stops, which would be a program budget total of about $22 million.

If that were the case, we would expect that number of truck stops to be able to service about one-third of the visiting trucks in California at any one time.

Coupling up with this DOE grant, which is a program primarily for the entire United States, so it's very important because we have to have adoption of the technology for the entire United States and so the states need to be working hand-in-hand and it's appropriate that California join up with the California piece.

That concludes my remarks, I'll take any questions.

MR. OLSON: Yeah, John, this is Tim Olson. Can you just elaborate; what's the -- what date do you have to have that matching money for your DOE? And congratulations, you're one of the few companies that I think won something.

We will be formulating the matching team in the next three to four months and we're ready to speak about that today.

MR. OLSON: And so I'm just curious how you -- you're doing some installations at the truck stops and then

something on the vehicle, is that an APU device for the truck vehicle or is that the --

MR. GUSTAFSON: The device that typically gets put on the truck is going to be an electric-powered HVAC system, and it can be an electric facilitated diesel-powered auxiliary power unit. Some of the auxiliary power units come with both electrical short-power attachment.

But we prefer, actually, going to a pure electric system, and they're cheaper, they're lighter, they're more efficient. And again, if there's not a diesel component on the truck that means they're saving more fuel.

MR. OLSON: Is that a pass-through grant from DOE through you to the truck owner, or are you doing this in -- you have a very good program for loans, for your Smart Way and other things you do.

MR. GUSTAFSON: The part of the grant will be a pass-through to the truck owner and that's the piece that puts, helps him and it incents the driver with about 25 percent of the cost of the APU or the equipment to go on their truck.

The infrastructure piece will go directly to pay for the equipment that's on the truck stop, itself, the 30 pedestals. The pedestals will be a revenue-generating or a revenue-sharing piece with the truck stop, itself, and then the company that maintains, and services, and operates the

pedestals. And we're trying to keep a cost of about a dollar per hour that's going to be charged to the trucker that pulls up.

MR. OLSON: Can you give us any range of costs for those pedestal installations; what is it for each parking spot?

MR. GUSTAFSON: Per parking spot it's a -- there's a two--part answer there. It takes about $35,000 to mobilize onto a truck stop and then each space is about $6,000, plus or minus, depending upon local permitting conditions and the requirements to bring power over.

MR. OLSON: Okay, I think we'd want to talk to you at some point. If not today, at some point with you, Sharon Banks, and your other people. Thanks a lot, appreciate it.

MS. BAROODY: Thank you, Mr. Gustafson.

(Applause.)

MS. BAROODY: Okay, next up we have Aerovironment. And I have you as Kristin Helsel, but you don't look like Kristin.

MR. HAYASHIGAWA: Yeah, I'm not.

MS. BAROODY: Okay.

MR. HAYASHIGAWA: I'm Larry Hayashigawa and I'm representing Kristin Helsel. She couldn't make it here, I think she got sick, so I'm going to try to do the best I can here.

Just a little background on Aerovironment, we were established in 1971, we have about 650 employees, and we're kind of a middle-sized company.

We have a legacy of innovation, we've been involved with alternative energy vehicles for quite a few years, going all the way back to the GM Impact, which was a predecessor to the GM electric car in the mid-1950s.

And from there we kind of split our business up into two major areas. One which is our number one revenue generator, which is the unmanned aircraft systems for the military, and for reconnaissance, and we've done quite well there.

And the other one a little bit more fledging, but ready to move out here with this EV business, is the efficient energy systems business, which covers all the EV test equipment, on-road fast chargers back in 1995, and then the off-road fast charging systems for all the lift trucks, and baggage handlers, and things like that at the airport. And then the EV chargers and fast charging system which are currently being developed or completed.

Just we're strongly a product-oriented company and so we have an extensive product array, which ranges all the way from -- for EV charging, let's say for in the public and residential area, our level II EVSE chargers for private, and public and fleet use, and then DC fast charging for

fleet and public use.

And then we also provide a neighborhood of electric vehicle chargers.

We also supply subsystems for EV manufacturers, so an EV manufacturer looking for a level I cord set, we'll provide them that, or an onboard charging system, or a lithium management system.

So we're involved in some of the subsystems on electric cars, also.

And then we also provide EV testing facilities, so we do a lot of battery testings for OEMs and kind of do some independent testing for other entities.

The other piece that I think we've kind of picked up here, because of this EV movement, is we have a program where now we have a nationwide installation in service and support program for installing chargers in the residential and commercial areas.

Thought I'd just throw up three little slides here, or three little tabs, to kind of describe maybe three scenarios that we see charging, we see at-home charging, which I think Richard likes to call where you sleep. But it's garage, curbside, multi-dwelling units, where you can get inexpensive off-peak energy power to charge your car.

Typically, it will be like either a level I or a level II charging, depending on the type of vehicle, whether

it’s a battery electric vehicle or plug-in hybrid charge times might range anywhere from four to 20 hours, depending on the capability of your charger.

Then public and office charging areas used to extend the daily range of your vehicle. You would see anything -- it’s very similar to what you’d see in the home charging environment, except I think you’d be a lot more time limited, so anywhere from four to eight hours of charge time would be available so, therefore, you could only bring your batteries up to a certain state of charge in that amount of time. But I think it would be just good enough for topping off to get home.

Then there’s fast charging which -- fast DC charging, which I think a lot of people term as level III charging, but I think we’re trying to change that nomenclature. Level III charging will be more like fast AC charging and then fast DC charging is its own category now.

And so you would use something like this for long distance travel, you might talk about highway chargers and/or a need to immediately charge your vehicle.

And something like this would take anywhere from a half-an-hour to one-hour charge time depending on, you know, how much energy you want to put back in the battery.

Oh, because of the widely varied installation requirements that we’ve had to face, we’ve had to come up

with multiple products and how we've answered that is really there's a core module that we utilize in every one of these chargers. So we might have a different basic stand, if you will, and then we plug in the different types of the core EVSE charger into that stand.

So we've got level II and fast DC chargers available for electric vehicles.

Some of these are more suited for garages which, like the first two, is probably more of a garage unit and then the dual port and the quad port are probably more for I'd say public parking spaces and multi-dwelling units.

These are kind of a hit list of infrastructure issues that we think we're facing. According to, and this is kind of a controversial topic I'm sure, but Pipe Research says that 80 percent of the chargers will be in residential locations.

And I think the fact that it's -- they're considering the level I chargers which come with cars as part of that. I think that's why the number is relatively largely skewed.

But nonetheless a lot of the focus, I think, on charging cars or electric vehicles will be in a residential area.

So what we're looking for is to encourage development of charging infrastructure for both residential

and public locations, and make sure that we have provisions for curbside residential needs, and also make a consideration for multi-dwelling unit needs.

And so anything that the California Energy Commission can utilize to help encourage the development of that process, that would really help speed the EV rollout.

Streamline residential installation processes, we've heard all kinds of stories about people -- you know, installations taking 30 days, or 60 days to do that, and we'd like to see this thing cut down to something like four days or three days. We've been challenged like a lot of the automotive OEMs to get it down to that day just to improve the user's experience with the EV.

So things like, you know, eliminate the need for submetering, that will probably speed it up. Although then you've got to figure out how to provide maybe EV power usage rates, but maybe there's more informal ways of measuring power for the time being.

Simplify permitting and inspection requirements. I think somebody suggested that the installer be certified to do that, so that the installer can actually certify the installation, that would really hurry things.

And then also if the PUC could be involved in some of the building codes, making sure that there's appropriate infrastructure in new buildings and new homes for EVs would

be something that could be quite useful.

The other thing we see is the distribution grid will likely be overloaded and I think the clustering effect was touched upon really early here in this forum, and we think that there's various technologies or programs that might help improve the distribution grid without having to spend a lot of money.

And then, lastly, we'd like to see some incentives for at least some method -- some highway charging demonstrations.

I think that one of the things I'd like to see here is actually going through implementing curbside implementation, multi-dwelling unit installations, and highway charging installations, just to kind of run through this whole process and actually try to execute on a program and see what kind of, you know, issues we run into, what kind of problems we run into, you know, what we could do better. And I think that's what some of these demonstration programs will really illustrate.

I think this is just a little bit on fast charging, since that's our thing here, can't let that go. But I think Commissioner Chong spoke about this TEPCO Electric Power Study and this is the study that they performed. And the little -- I don't know if you can actually see the little -- yeah, yeah, you can see the

little red arrows and those are kind of like where the cars drive around in the first chart, and then you see one little pink box, and that's the charger that they had there at, I think, Tokyo Electric Power, and the cars would only go a very limited amount of range. I'm not exactly sure what the mileage was, but they would only drive around a little bit.

Then they'd measure the stated charge of the vehicle, which is the chart below the map, and the cars would be coming in at 70 and 80 percent stated charge, ideally, so they weren't really utilizing the vehicle.

And what they found out was it was range anxiety and the people, the drivers were afraid to actually take the vehicles beyond a certain range because they were afraid they couldn't get it back.

So in July of 2008 TEPCO actually installed a second fast charger and you can see that on the second, the stage two map there, there's another chart. And then you can kind of see that they mapped out the vehicles again, and then when you looked at the stated charge of the vehicles that came back, the stated charges showed that the vehicles were being utilized in a much greater fashion.

And although many of them didn't -- I would say that I think the story is that most of them did not use the fast charger, so they just used the vehicle a little bit more, but they were confident that they could, if there was

a problem, you know, they could get back. So that's another kind of a use for fast charging.

This is my closing thing so I think the one thing is that we want the thing to be convenient, so we need to locate charging stations where drivers need and expect them, so home, work, retail, on the highway.

We should have some kind of pay-at-the-pump for public and fast-charging systems. We need to have standard connectors so that, you know, Mini Es can plug into EVSEs, and Volts, and Nissan Leaf canal plug into the same connector and that's -- there's still a problem there, actually, today.

Fast charging, we think fast charging provides convenience, charging in minutes, not hours. Provides a range extension for battery electric vehicles and promotes use of EVs between cities.

It's not super rocket science, it's all been done before with forklifts.

And we'd like to have, and I think that maybe some more stakeholder participation from the OEMs. In terms of the installation process, I think they're going to face some challenges there that they haven't actually anticipated. And then, again, more demonstrations.

So kind of proof of installation concepts and theories that we all have here about how this industry

should work. And that's it.

MS. BAROODY: Thank you, Larry. Any questions?

(Applause.)

MR. OLSON: Hi Larry, this is Tim Olson, I have a couple of questions here. Your comment about locate the stations where the drivers need them, is there enough data to do that? Are automakers providing that information to you or what has to happen there to --

MR. HAYASHIGAWA: Yeah, I think -- I think the only place the automakers are sure that they need charging stations are at the home. Other than that, they're kind of silent, strangely silent about exactly where they're going to go.

I think there's some organic ways of doing it, maybe polling the EVSE users, you know, and getting their feedback to see where they might -- would like to see charging stations appear.

MR. OLSON: And just to clarify, your company just manufactures the product or are you doing the installations, do you own any of the systems?

MR. HAYASHIGAWA: Yeah, we manufacture systems, we sell to OEMs, and we also provide installation service and after-sales support.

MR. OLSON: Can you elaborate on the cost of the fast-charge system?

MR. HAYASHIGAWA: Fast-charge systems today run, I think for a 50 kilowatt system, in the range of 30 to 35 thousand dollars.

MR. OLSON: Is there any capability to reduce cost, either through technology advance, economy of scale, and manufacturing?

MR. HAYASHIGAWA: Yeah, there's -- of course. We build, just to give an idea, in the industrial forklift side we've got 30-kilowatt chargers that we sell for around $9,000. So, yes, there's lots of room for cost reduction.

There's also different ways of maybe sharing their charger so that, you know, it can sequentially charge multiple vehicles at the same time and that will help reduce the infrastructure costs and capital costs.

MR. OLSON: So on the forklift, that's a more mature market for charging systems. Was there a breaking point where you started getting those cost reductions in terms of units sold?

MR. HAYASHIGAWA: Yeah, I think around -- I would be taking a guess, but probably around 8,000 units a year, that's when we started seeing some significant cost reduction. So it's not a lot.

MR. OLSON: Thank you.

MS. BAROODY: Thank you very much, Larry.

We're going to take just a five-minute break,

okay. I actually have Colin Read with ECOtality, eTec, up next, he's here; right? Yes, okay.

So in about five minutes or so.

(Off the record for a break.)

MS. BARODY: We will have Colin Read, with ECOtality up next. And then after that we'll have Mark Aubrey, with Smith Electric Vehicles.

We are going to break at 12:30 and so we will have the Bay Area Electric Vehicle Corridor program go after lunch, if that's okay. Is that okay or, if not, we'll have you go before. What do you prefer, your choice, before or after? After, okay.

We're just a little behind, we have a little bit more time in the afternoon.

Okay. All right. Okay, I'd like to present Colin Read.

MR. READ: Great. Well, thank you, Leslie, I appreciate the PUC and the CEC inviting us down here to present today, to discuss a little bit about ECOtality and what we're doing in terms of rolling out infrastructure and electric vehicles here in California, and four other states here in the United States.

That being said, I'd like to thank everyone for taking their option day of work here, on Columbus Day, to come be with us. Thank you.

ECOtality, we're a leader in clean electric transportation. Are two primary subsidiaries or eTec, Electric Transportation Engineering Corporation and Energy Power.

Most of this presentation will be focused on the work that ECOtality does through our primary operating subsidiary, eTec.

But just briefly, Energy Power is a manufacturer of specialty solar application, solar modules, as well as renewable battery systems.

So from about a 40,000-foot view right now, ECOtality, we're a leader in clean electric transportation. We are one of the few firms that were lucky enough to receive Federal funding for transportation electrification.

As part of that project we're deploying approximately 4,700 Nissan Leaf electric vehicles, pure battery electric vehicles, zero emissions. We're doing this in five states, about 13 different cities at this point.

We're going to be deploying a total of 11,210 charging stations in these five different markets.

I'm going to go a bit into detail about this, what we're calling the EV project, later on in this presentation. I'd also note that the California Energy Commission has awarded us funding of $8 million, of which we're very appreciative, thank you, which will be going towards the

deployment of infrastructure in San Diego.

A little bit of facts about ECOtality. We have been involved in every major EV initiative since 1989, eTec, our main subsidiary, was actually founded in 1996, but through its affiliate companies, Electric Transportation Applications, in the Clarity Group, actually has a history back to 1989.

Our primary product that we provide, our service offering, is fast-charging systems. We've installed over 5,600 charging systems for industrial, airport systems, and the like. That technology has over 50 U.S. and international patents, as well as a Fortune 500 customer base for industrial and airports.

Additionally, we do a lot of research and development. Consulting work is one of the primary sources of business for ECOtality. We've been a primary contractor of the U.S. Department of Energy for the last ten years.

We like to joke that we're somewhat like Noah's Ark in the fact that we get two of every advance vehicle before they come to market, where we run these vehicles for over 150,000 miles, doing advanced dynamometer and battery testing for these cars.

To date we have over 10 million miles of testing on over 200 advanced vehicles that include plug-in hybrids, electric vehicles, and fuel cell vehicles as well.

So eTec's main strength really comes with Powell Electronics. We have extensive research and development capabilities engineering electric drive systems.

The company, as I mentioned earlier, dates back to 1989.

We help pioneer, along with Aerovironment, along with some of the other fast-charge providers, fast-charging technologies in the mid-1990s. Our technology was actually developed for specifically on-road electric vehicle applications.

Unfortunately, as we were about to bring this technology to the market, a lot of these cars got taken off the market, so our company had to adapt, we had to find new applications for fast charging. At that point the only electric mode of applications out there were industrial applications, material handling, lift trucks, forklifts, pallet jacks, as well as airport ground support equipment.

I've already touched briefly on the AVTA activity that we do with the Department of Energy.

Other activities we do is we do a comprehensive EV infrastructure program, we call that the EV Microclimate Program, which I'll talk a little bit more about later on in this presentation.

But one thing that I think separates us from some of the other presenters up here is that we believe that a

rich charge infrastructure will mostly be comprised of level II and level III charging. If we have level II charging systems in the market right now, a lot of the two-wheel and three-wheel vehicles we hope would be compatible, we hope that they meet national electric code and should be able to charge using a typical level II connection.

We do extensive amounts of battery performance testing, we have a very strong relationships with the Advanced Lead Acid Battery Consortium. We do extensive battery cycling and development.

And we've also had a long history in hydrogen. We've done some of the most advanced hydrogen infrastructure systems in the country. We did the APS Hydrogen Park, which is used as a safety standard around the world for hydrogen infrastructure facilities.

We also worked closely with Rauch Engineering and Ford to create hydrogen internal combustion vehicles, the F-150, as seen here.

So our minute charger system, as I discussed earlier, was developed primarily for on-road electric vehicle applications. We had to adopt that to new applications when these EVs got taken off of the road ten, 15 years ago.

Again, we currently are servicing the airport industrial markets and we are looking to use this technology

and modify it for the on-road applications.

Some of the advantages here with transferring to electric and fast-charging for industrial and GSE is that it reduces the annual fueling costs by about 70 to 80 percent, especially in GSE, you no longer have the need for diesel, or LPG in your material, your baggage tractors, your belt loaders, the like.

Our systems right now, we use an IGBT design which makes them 50 to 65 percent smaller than some of our competitors, as well as 50 to 70 percent lighter, which means that we're able to take a fast-charging system and pole mount that.

When we start to use this charging technology for on-road applications, the small footprint and the light weight is really going to come in handy here as we make these, I guess, sexier consumer applications.

So some of our charge infrastructure experience, we've actually installed more chargers than any other company right now to date. You had over 400 EV chargers installed for the original GMEV-1s, we did the majority of installations here in California, as well as Arizona.

We've set these up in the residential, commercial, and public locations.

You'll see up on the Power Point there, on the top right there is an installation we did for the U.S. Postal

Service.

Down in the bottom left is an installation that we did at the Biltmore Fashion Square, one of the major malls in Arizona. During the original round of EV-1s we installed charging systems at all the major high population areas, which at the time were movie theaters, shopping malls, strip malls, the like.

Recently we were awarded the 99.8 million DOE award, and I'll talk a bit more about this later on. But, really, that's going to be a data collection project which is going to have a big impact, we think, on the EV industry.

Some other infrastructure that we have done in the past, we help different regions, different states, different municipalities in procuring grants. Currently, we're working with about five different states to help them procure some of the Federal funding opportunities that are out there.

We bring together and coordinate local utilities and government agencies. I think that's one of the reasons why we're speaking here today.

We believe in a holistic approach to infrastructure. As an infrastructure provider, our job is not just to manufacture EVSE and give it to people, it's our job to make sure that there's a market for this EVSE as well. That means that making sure that building codes, that

provisions such like they have in Vancouver which, or that they're also enacting right now in Washington, in which they're making sure that all single- and multi-family dwelling garages make the proper allocations to have the circuitry for EVSE to be installed in that garage.

We think that by doing common sense types of policies like that, it will help greatly reduce infrastructure costs and the installation costs.

Back in the mid-nineties, here's some examples, some more examples of some of the chargers that we have put out in the field. You'll see some of the EV station features. This was obviously a generation one product, but this was kind of the most cutting edge at the time.

It had access, secured access with the RFID cards, had data monitoring, it had a 24-hour call center.

Bumper guard ADA compliant. This, at the time, had all the bells and whistles, and you'll see that right now companies, like Coloumb Technologies, A Better Place were pushing that envelope a bit further.

That the user functionality for this next generation of chargers is going to be much more robust than we're used to having.

We didn't have the ability to program a charger on our phone back in 1995 because my phone was the size of a brick. Actually, I didn't even have a phone at that time.

This time around we have Smart Phones, we have i-Phones, we have Smart Grids being put into place that are really going to change the dynamic of this industry.

We believe that the era of the dumb charger may be over, that the new chargers that we're going to install are going to be smart, intelligent chargers to meet some of the utility demands and the demand response applications.

So some of our current products that we have, you'll see that we have extensive portfolio of products for industrial and airport applications.

The top two, the PJ and the SC are designed for industrial applications. They're some of the smallest profiles on the market or footprints on the market.

Down on the left you see a GSE 300, I believe, which is what we use for airport ground support equipment. If you fly out of Oakland Airport anytime soon, you're flying Southwest, your push-back tractor, which is a 35,000-pound push-back tractor that can stop an airplane, we power that. It is one of the most critical applications they have and they trust our fast charging for -- over 12 years, now, we've had airport support equipment there being fast charged. We're in 14 different airports across the country.

Right now we're also developing our next generation of level II and level III charging systems. We believe that these are going to all be J1772 compatible.

We're lucky, as David said before, that this time around we have all of the major automotive manufacturers onboard with a common connector, communications, and plug, which really is going to cut down on a lot of the problems we had in the initial go-round, and allow us to create a universal charge-up infrastructure.

We expect our initial products to be unveiled in the second quarter of 2010, which is also the same time we'd expect to be installing these as part of our program.

Here are a few concepts of fast-charge systems. Again, having one of the smallest and the lightest profiles on the market, we're able to make these charging systems look similar to a gas station, like a gas station will look today.

We believe that major retailers are going to be some of the key adopters of this fast-charge technology. The dollar fifty a charge to get people in a store for 15 minutes is very valuable.

In most urban locations, you know, people live in apartments and high rises, fast charging may be one of the only options they have. Obviously, there will be plenty of street-side charging available as well, but for many people we believe that fast charge will be one of the great enablers for electric transportation.

We also believe that electric vehicles allows us a

unique opportunity to change the way we think of fueling infrastructure. No longer does a gas station become a destination spot. We want people to charge where they normally go, where they live, where they work, where they play.

If you shop at a supermarket for 15 minutes a week, that may be a great time to top off.

In urban areas you may be using fast charging really as a way to top off from location to location.

When you start talking about electrifying transportation corridors, then you're probably looking anywhere, about a 26-minute charge is what Nissan's claiming on the Leaf. We believe we could possibly do that faster.

But those are now destination spots in which people stop, they use the restroom. If they have kids, you're obviously making the stop every hundred miles, you can purchase your soda, get your cup of coffee, and get on the road.

So as I discussed before, we take a very holistic approach to EV infrastructure. We've developed what we call our EV Microclimate Program. This really ensures that areas are plug-in ready.

There are a lot of programs and projects out there that provide guidelines and provide steps that make an area plug-in ready; we actually get on the ground and we make

sure that there's someone managing that process.

And most organizations, if someone's not actually doing it 24 hours a day, seven days a week the job doesn't get done.

We create turnkey program for utilities, for municipalities, for cities to make sure that they have the proper regulatory environment for these electric vehicles to succeed.

We make sure that when we do this process one of the first things we do is we do an EV roadmap process. This is a strategic blueprint and action plan for the area, we pull together all the key stakeholders. This is more than just the utilities. These are the local governments, these are the utilities, these are the large commercial real estate developers, these are the major employers, the major businesses. We need to get the community on board for the community to embrace this.

We can then go through and do a detailed roadmap action plan, we layer on some of the electric utility infrastructure requirements. We find the highest traffic areas, some of the most highly populated areas. Prius penetration is a great way to look at where potential markets will be for these vehicles.

We take that, we then go back out with those stakeholders, we ask them what they think of this, we get

their input.

Because the bottom line is we may know a lot about infrastructure, we don't have all the answers, and we certainly do not know your area better than the local stakeholders of your area, so we make sure that their voice is listened to as well.

And from there it begins the actual process of implementation. I would note, before getting into kind of actually deploying infrastructure, soft infrastructure development is one of the priorities here as well. First responder training, making sure that there's roadside assistance, dealer training, public awareness campaigns, government awareness campaigns, these are all part of the solution.

So in a sense we really see ourselves kind of at the middle, as the glue, which helps meets the needs of the manufacturers, the EV owners, the utilities, policymakers, and charger operators.

And ideally the microclimate is kind of as follows, and I'll kind of go around in a clockwise fashion here. At the top you see -- well, it looks like it's from the Simpson's, but it's actually supposed to be a demand control center for a utility right there.

We really believe that charge infrastructure needs to be well in line with the incentives and the initiatives

of utilities for demand and load management, demand response and load management.

To the right you'll see a typical commercial installation, where this could be a WalMart, or a Target, or a supermarket in which you have charging available out front.

We've highlighted the next slide over. The Smart Meter in someone's home, we believe that integrating a EVSE with the Smart Meter, making sure that the EV owners can control their time of use, making sure that utilities can influence that time of use is extremely important.

Down below there's a retail location of a gas station -- or a fast-charge station. We've included at the bottom there some street-side parking, which looks very similar to what Coloumb Technologies does, and we believe that's going to be a very strong solution in areas that adopt this type of technology.

And then obviously, on the left, you see a large employee parking.

We agree that most people need to charge where they sleep at night and where they work. Really, your car is parked 22 out of 24 hours a day there, the other two hours probably being church for most Americans.

So we recently received $99.8 million for the Department of Energy for transportation electrification. We

are going to be deploying 4,700 cars, Nissan Leafs, in five states. Roughly going to get about 900 in most areas, some areas will get more. We have 11 different cities right now and that's actually drastically expanding. You'll see in some places we had the San Diego region, or the Seattle, which is the Puget Sound region.

Each day we have new cities coming to us, asking to be part of this program.

As an overview, it's $99.8 million in funding from the DOE, it is a 50/50 cost match. Most of our cost match is coming from the direct sale of the vehicles.

In exchange for purchasing a Nissan Leaf and being a part of the program, we install a data monitoring system on the car so we understand what the driver, EV driver's usage patterns are, especially where they are using the infrastructure.

The purpose of this program is very much data collection. Today there's been a lot of questions as to how do we roll out infrastructure, how do we bill for infrastructure, where do we know where to build it?

We're hoping that this project answers most of those questions.

You know, we have been involved in almost every EV initiative to date, we consider ourselves to be experts, but in no way do we know all the answers here, I don't think

anyone knows all the answers.

We know where a lot of land mines lay and our goal is to avoid those but, really, this is about data collection. We chose our five different markets or our 11 different cities, A, because they have a very favorable consumer demographic for purchasing these cars but, B, because they're all very different.

We want to understand how the vehicle usage, how the infrastructure usage differs from different topographies, from different climates. These are necessary -- and from different urban areas.

If we want electric transportation to spread across the country, to spread across the world, these questions need to be answered and they need to be answered now.

So as I said, we're deploying 11,210 charging stations, 4,700 of them will be residential, for in exchange for providing us the ability to collect data off your car, you'll get the free EVSE Level II installed in your house. This will cover all of your hardware and installation cost for those that sign up for the program.

So 4,700 of those chargers will go directly into the residences.

6,250, the remaining of those level IIs, will be distributed amongst the five markets.

We kind of broke that down and on average you're getting about 900 vehicles per market, you're getting about 2,050 level II chargers, and you're getting about 40 level III chargers in each area.

With the 8 million from the California Energy Commission, these numbers in San Diego have been increased. We are proud to say that California and San Diego, specifically, truly will be the leader in EV infrastructure, and they'll have the most robust, most mature, the richest charging infrastructure in the world.

There will be at least a thousand vehicles, Nissan Leaf vehicles deployed in the San Diego region. There will be 2,350 level II chargers deployed, this includes both the home installations, as well as the public and commercial installations. And there will be 60 level III chargers provided in the San Diego region, 50 of those chargers will be going directly to San Diego County, and to ensure that those people do not have range anxiety, that they have a way to conveniently fill up on the go. And another ten would also be used, ten fast chargers will be used to deploying what we call EV corridors. We're looking at I-8, we're looking at I-5, trying to connect San Diego to other areas that are going to have EV infrastructure.

In Phoenix and in Tucson we're going to have a rich infrastructure, so that I-8 corridor, and possibly the

I-10 corridor makes sense.

South Coast Air Quality Management, AQMD, I think it's called, they also have received substantial amounts of funding in their region to deploy plug-in hybrid electric vehicles and infrastructure. So we need to make sure that there are no holes in the dataset. We want to work closely with them and, if we can, try and connect San Diego to Los Angeles.

With A Better Place, we really adopt their approach in saying that infrastructure needs to be built out in the densest population areas, the places that are going to adopt these cars first and have the biggest penetration, and from there connect them to other population areas, so San Diego to Los Angeles.

In Oregon there's Portland, Eugene, Salem, Corvallis, as well as Seattle. We're also looking at an I-5 corridor up there.

A bit about project schedule, we were awarded the contract on October 1st, we were the only funded program under electric transportation to be funded and fully contracted by October 1st.

This has been a top priority of the Obama administration and, specifically, the Department of Energy.

Our first step, first and foremost, is to do, to enact what we call the EV Microclimate Program. We need to

go through, we need to have an extensive road mapping process. We need to bring together stakeholders, we need to get input from the community.

We've launched a site called the EVproject.com, which allows people to go online, see where many of the Coloumb charge stations are, see where the old generation one charging stations are, and suggest where do they want to install a charger.

We want the public's input. We want to know, if you're going to purchase a car and where you want us to put infrastructure. So we expect that process, setting up regional offices, to take about six months.

In the gain of Q-3 of 2010, we're probably looking around June, early June, we're hoping to deploy the first infrastructure in each of the five markets.

We hope to have the majority of infrastructure in place in these markets before the vehicles get launched, the Nissan Leaf vehicles, in the November/December time frame of 2010.

From there we're going to assess for the next six months who's purchasing these vehicles, what employers have large fleets of these cars. Again, we want to make sure if you have employees that have many of these vehicles, that they can charge at work, so we're going to make sure we allocate some of those chargers for those employers, for

those key pockets of the population that we may have overlooked in the initial deployment.

By Q-2 of 2011, this is really about a six-month period, we hope to have all 11,210 chargers deployed and all 4,700 vehicles deployed. We want the first cars on the road and the first infrastructure be used and have at least 24 months of data collection.

Q-3 2012 we expect the project to end and then we will be doing some data collection and analysis on the remaining data, we'll be publishing our reports quarterly and sharing that with interested parties. Again, the purpose of this is education.

So a bit more on residential, we're looking at approximately 900 to 1,000 Nissan Leafs in each market. People can sign up online at Nissan.com, they can sign up on the EV project, they can also sign up at the Nissan dealer. The most important fact is they need to purchase the Nissan Leaf. Once they do that, they'll be provided the ability to opt in. We believe that the savings on hardware and installation costs is a very compelling value proposition for them to be part of the program.

At the end of the program they'll also be able to retain all the infrastructure that they had installed.

In addition to that, we're going to have about approximately 900 to 1,000 level IIs.

Actually, let me retract that. This level II infrastructure that we're putting in, as we discussed earlier, it's going to be Smart infrastructure. We believe that having revenue grade meter inside the box may be important just so that we can understand what issues are coming down the pipeline and preempt any of those.

I think there's a lot of issues around taxation of EVSEs if these catch on in popularity. I think there's also issues around utilities wanting to separately bill for the electric vehicle electricity that's being used. So providing a revenue grade meter inside of the box helps meet a lot of those demands.

Internet data collection will be used. We would ask that people in the program have a wireless internet connection so that we could transfer data periodically.

We're also working with partners, like Cross Country, TX, telematics providers, and possibly using systems inside the vehicle to help transmit data as well.

Our main project partners on this is GridPoint, who's helping us out with demand response, and Bovis Lend Lease, who's going to help us out with the installation.

Obviously, these are a lot of chargers to install. We do R&D, we do engineering and hardware. We are a licensed contractor in about 20 states, but this may be something that we're going to have to study and decide

whether this is something that we need to do, or whether companies like Bovis Lend Lease, the largest construction management firm in the world may be best equipped to handle it.

Commercial infrastructure, again, it's roughly 12,050 level II EVSE in each market. That number is somewhat changed. This is based off our initial proposed project, but it's closer to around a thousand right now. Again, this is going to be revenue grade meters. We want them to be fully integrated with the utilities' demand response.

We're looking at different revenue systems. We believe that as an industry we need to be -- have our arms open. We're on the forefront right now of what could very much be a revolution and we can't all go about and develop these solutions behind closed doors.

We've brought in Coloumb Technologies here as a very strong partner, they have a very unique revenue and building model that we would like to experiment with. We think that their street-side charging is a very viable solution and we'd like to understand if a utility or a municipality would like to implement that solution, if that's an option available for them.

There's not one-size-fits-all for infrastructure.

Some of the employer locations will be tied to the

vehicle sales, as I mentioned earlier. CB Richard Ellis is one of our project partners, they're the largest manager of commercial real estate. And again, Bovis Lend Lease will help us with the installation.

I think I've covered that one a little bit.

Fast chargers, we're going to have 260 total level III chargers installed amongst the five areas. As I said before, the San Diego region of Southern California will have at least 60 of these. It's roughly going to be between 40 and 50 in each other market.

The telematics interface will provide us status on the price, will provide us information on the availability. Again, this is generation two.

You will be able to look at your Blackberry, your i-phone, you name it, to make sure that you know where is a charger, where it's available, whether it's in use, whether it's in order, and possibly even raise your hand and get in line so you don't have to wait at one of the chargers.

Some of our project partners here are Bovis, CBRE, Cross County ATX, with their telematic solutions, as well as British Petroleum America. BP, which operates all the AM/PMs, the Arcos, are initially helping us out with strategic planning and site selection, but we're also going to be in discussion with them about possibly trying out some of these solutions in some of their stations.

The last thing is data management analysis. Vehicle and charging utilization is the main goal of this. We want to make sure that these 4,700 cars will help lead to the deployment of the next 4.7 million cars, making sure that we have an open platform of data, that we can share this with the relevant communities, relevant municipalities is one of our top priorities.

Idaho National Lab, Ohio State University, GridPoint, UC Davis are all project partners in helping to collect and analyze this data.

There will be quarterly reports on the progress of the project. That will be disseminated, I believe, through the Department of Energy's website.

Go from there, the lessons learned is going to be pivotal here in making sure that we deploy infrastructure effectively.

Part of this whole process is understanding how can we minimize the cost to the taxpayers, how can we create an infrastructure that is sustainable economically, and not purely dependent upon handouts. The retail, the commercial locations those are great ways to figure out what models work. Is free charging going to be free, is that really viable? We need to understand that.

Again, some of our project partners, there's over 40, over 40 project partners. We have about 14 or 15

different utilities that represent over 42 million service customers. We have three different state organizations, about 11 different cities, 25 regional or strategic industry partners.

On a last note, I wanted to address some of the questions that the CEC helped provide or asked us to address. I know this is somewhat rambling here.

We believe that the cost per installation is going to vary drastically by type, especially by volume as well.

Commercial and multi-family installations will probably be more expensive than single-family residential installations.

We believe that initially a lot of the volume is going to be dictated by the vehicle penetration. We believe that 1.5 public or commercial chargers per car is a strong initial ratio to deploy commercial infrastructure in line with the vehicle deployments, so that we have that rich, mature charge infrastructure when first they have these cars.

If first adopters don't have a successful experience, the industry doesn't have a successful experience.

That ratio will quickly diminish to zero once we have a quote/unquote rich infrastructure in place.

We think that the needed steps to create this are

what we've encapsulated in our EV Microclimate Program, the road mapping, the stakeholder awareness, the first soft infrastructure deployment, the like.

As for incentives, we believe that making sure that infrastructures are smart, not dumb chargers with an on/off switch, but smart chargers is going to be very critical to meeting the utility needs, meeting our energy demand needs, and also meeting the functionality that consumers expect this day and age.

We think that possible incentives to upgrade to a smart charger would be -- possibly be an approach that the PUC and the CEC could investigate.

We would estimate that the costs of about 50 -- $500 to be a premium of smart chargers of dumb chargers. Maybe not dumb, but maybe normal, regular chargers.

We believe that the total installed costs of smart EVSE could run from 1,500 to 2,500 dollars for the hardware and the installation.

Level II charging hardware's going to become a commodity, it's going to become a commodity very soon. Some of them are asking that we provide these level II chargers as low as $500. To meet that, obviously, there's volume requirements.

But we need to reduce the cost to a residential EV purchaser as much as possible for the industry to succeed.

Further incentives would be incentives for commercial Smart Grid fast charging. Fast charging, as our friends from Aerovironment discuss, is a very expensive proposition, you're looking at around 30 to 35 thousand dollars for the car, another 10 to 15, or possible 20 thousand dollars for installations.

Some commercial facilities are already prewired, most Wal-Marts and Targets are. But perhaps putting in incentives to address the Smart fast charging may be another strong approach.

And I believe that's about the extent of our presentation. You know, I would just kind of add on here that this project is very forward looking, it's one of the most progressive that the world's seen to date.

We assume a lot of leadership here and we thing that whatever chargers we use, the functionality that we implement in this initial trial is really going to set the standard for the rest of this industry to follow, and so we take that position respectfully, but are also prepared for the hard work that we have at hand, and we look forward to working very closely with not only the PUC, the CEC, but all of the rest of the infrastructure providers and solution providers at this panel today. Thank you.

MS. BAROODY: Thank you, Colin.

(Applause.)

MS. BAROODY: Question?

MR. OLSON: Yeah, Colin, I have a couple of questions. Could you elaborate on or clarify, the total cost for your project in five states, $207 million, and about half of that government incentives. The remainder of that, is that --

MR. READ: We've been allotted $99.8 million from the DOE for this project. That 99.8 is directly cost matched by our project partners. When you purchase a car and you sign on to share your data and be a part of the project, you become a project participant.

And that cost which the people provide for their vehicle, the costs that they will spend for charging their car at home, some of the costs that are being spent to install these chargers at premium locations will all be part of the cost match associated, so that 99.8 is also matched.

The California Energy Commission has been -- so grateful, to give us another 8 million for our successful proposal, which will also be matched in the San Diego area through similar resources.

We're also in discussions -- so that bring the entire project up to $207.8, I believe, not including the California Cost Match.

We're also in discussions with various state governments. The State of Tennessee is actively discussing,

they've allotted 5 million towards electric vehicle deployment and infrastructure. They're looking at providing incentives for -- further incentives for people to sign up for this program, as well as additional funding to deploy more infrastructure. There's three cities there so they're looking strongly at fast charge.

MR. OLSON: So in terms of private money and the actual installation of the systems, is there any private money in that?

There is. I mean, the private money is all coming from the actual purchasers, the private consumers that purchase this vehicle, it's coming from some of our project partners who are providing money for some of the R&D as well, and some of the deployment infrastructure.

People are providing -- project partners, CBRE, for instance, is putting up some of their premium locations at office locations, at retail locations to install their chargers.

MR. OLSON: There was a previous comment about separating meters or streamlining the permitting process, and that meant not having separate meters, meaning that there's a time factor in that installation that is preferred to get down to one day. Any ideas on how you do that? I mean, how do you keep -- it seems to me that you're going to trigger tier II, tier III pricing if you don't have a

separate meter.

But what's the -- any way of reducing the time frame for installation?

MR. READ: Well, we think that the building codes is kind of our first step, making sure that the single-family dwellings, that the garages for most residential dwellings have provisions, whether that's a dedicated 240 volt circuit, or whatnot, so that the actual installation costs get knocked down tremendously.

I'll be the first to admit that I'm not the most technical in this field. Kevin Morrow and Don Conner are the principals of the company. Don is actually traveling and Kevin had an issue in the family, which he's unable to attend.

But I know that one of the issues that they are currently discussing is possibly using the installers to be certified, installers to permit it as well.

As mentioned before, the last thing we need is for someone in the City of San Francisco to be able to install a charger in seven days, but someone in Tiburon to take seven weeks to have a charger installed, and for a much greater cost, making sure that those installation costs are consistent throughout areas and making sure that the installation period goes from perhaps four weeks to perhaps four days are things that we're looking to address.

MR. OLSON: Okay, thanks a lot.

MS. BAROODY: Thank you very much, Colin.

MR. READ: Thank you.

MS. BAROODY: Well, I think we're probably all ready for lunch, so our three morning panelists have agreed to come back at 1:30, 1:35, or 1:40. Let's see, we'll do 1:35, so we'll take an hour now for lunch.

And then we have a little more time in the afternoon so that should work out. Thank you.

(Off the record for the lunch break.)

--oOo--

1

2

3

MS. BAROODY: Okay, I'd like to introduce Mark Aubry, with Smith Electric. Are you ready? Oh, we're not ready, we're almost there.

Okay, I think we're ready now. Mark Aubry, Smith Electric.

MR. AUBRY: Okay, I don't know if everybody's back yet, but we'll get the process started for the afternoon session.

We're glad to have everybody here and certainly thank Leslie, and Peter, and Tim, and PUC for allowing us to be here, and the audience this afternoon.

I'd like to take the opportunity to give kind of an overview of Smith, we're the only OEM that's representative on this panel, so I think that's kind of unique. But I'd like to give a quick overview of Smith, some of our products quickly, and then our rollout, and certainly seeing that we're talking about infrastructure, some of those basic needs.

Talking about Smith, a lot of you may or may not know who Smith is. We have spent the last 24 months soliciting partnerships with a number of key corporate launch partners with a significant California presence, they have a lot of urban transportation and logistics operations that are based here. They are, most of them, as you see in

those representative companies that's just a small handful of them, those will be some of the first products and first companies that will have vehicles in the California market, as well as across the nation, and we are strategically placing them in -- trying to place them in the San Francisco Bay Area.

Ultimately, what we are working with is committee partners on leveraging the maximum level of matching program funds and in-kind contributions to ensure that our rollout is met with successful cooperation and with both willing and well-funded collaborators.

And I'll go into some of the DOE funding that we've got coming up, in just a second.

As you can see from this next slide, some of the right history that we've got out there, all we've ever made is electric vehicles. And if you start in the top left-hand corner and work your way around there is the original company that we started with is Northern Coach Builders, and back then all we ever made was products from the ground up. Today, certainly, we don't do that, there's a lot of other products that we make and it's a lot easier and a lot less expensive, a lot of less expensive products that we put together.

Talk a little bit about the Smith mission stand point, really three areas. The bridging the gap, as we like

to call it, in the development stage, where hybrids used to be five or six years ago, now they're widely accepted. We really feel strongly that battery electric commercial products and OEMs, as they come online, are in this phase that really needs to bridge the gap, and that bridging of the gap to where the herd will readily accept them is a finite amount of time.

And we feel that the place to do that, in this case today because of timing, because of infrastructure, because of those who are willing to accept it is the commercial fleet market.

When you look at the technology and legislation driving the cost down, we are clearly working with the utilities in every market, and that utility partnership with the independent systems operators, with the, in this case, California Energy Commission, California Air Resource Board, and a number of the individual infrastructure companies that were here today, trying to drive down that technology, and the legislation, and ultimately getting the cost down.

We see today trucks, in the commercial fleet application, as being a first entrance point, then to have busses come into the market, and ultimately to have cars.

Our first product is the Smith Newton, that is online today in production in our Kansas City, Missouri facility. That is a vehicle that will go up to 26,000-pound

gross vehicle weight. Although that's a box truck that you see on the picture shown, through DHL, we make anything from a dump truck to a aerial truck, to a flatbed. Really, whatever you would put on a diesel equivalent, that's what could be put on the back of the Newton.

From a infrastructure stand point, the 220 volt, 50 amp three-phase, or level II charging is what we would need on that vehicle. And as I mentioned a second ago, all the infrastructure companies that have been represented here this morning, we have had conversations with them, and dependent on the market and dependent on the needs we are working with them to determine the right application.

Next year, in early 2010, we are working with Ford on the transit connect platform. As you may know today that that vehicle is out in gasoline version, that came out in July, we are working on that product as a all-electric vehicle. Certainly, the infrastructure needs for that are a little bit different in that it only requires single phase, and the operator has a little bit of a variety of needs, so we'll have a little bit different infrastructure.

But that will certainly be a very credible product and we have had that product in production in Europe for the past number of years, and under Smith UK has been a fantastic, well-received product there and we're excited to bring it into the market here, in the U.S.

Certainly, the right applications, I don't think that's anything really too critical to share with everyone in the audience today, but if you don't put the right vehicle with the right customer, and the right application, you're going to have a failed product.

So certainly those ones on the right-hand side of the screen is what we would go after and look for as the right customer, spend a whole lot of time on that.

What we have tried to do also, on our first product, is take the vehicle and give a variety of different applications, at the same time, in order to keep costs down, bring a variety of battery configurations. So if you only need to go 40 miles, why have a one-size-fits-all battery pack. So we go anywhere from 75 miles all the way up to, really, 160-kilowatt, if you're driving a utility bucket truck that will give you the 150 miles on a single charge.

Certainly, from these three key areas are the ones that we are primarily focusing on, driving out costs. Ultimately, today, day one, regardless of what your capital expenditure is, that operating cost is significant -- significantly reduced.

That urban delivery or that urban cycle of any of these companies that we are working with is critical from no noise, no vibration, quick acceleration, but then even an actual day-to-day driver that's using these vehicles love

them more than their diesel equivalent, their diesel partner. And certainly, zero emissions is a critical piece for any city that's involved.

I won't spend a whole lot of time on the engineering components of the Newton. We put them on there, some folks like to see all the individual pieces that make up the Newton.

Going back to the DOE amount of money that we received, we put in for significantly more than what we got, but we were excited that we received a $10 million grant, which ultimately turns into to be a $20 million project. That is in full succession today.

We were also awarded a number of Clean City Grants across the nation, which we have a number of our partners putting in their vehicles and rolling out, ultimately through Q-1, Q-2, through Q-4 of 2010.

Underneath that incentive opportunity you see the individual vehicles that we put there, plus there will be others. The way we have worked it out is that there will be a $50,000 usage fee donated, in this case, by Department of Energy as a cost-sharing perspective. They want the data, we want the data.

I know from an energy perspective, everyone wants the data that is coming off of these. So that $50,000 usage fee will be given to each program participant for every

vehicle that's ordered and in return we would have the data coming back from that.

Certainly, some of these states, California, Texas, Colorado, and Arizona are some of our initial states that we will be working towards, as well as trying to push up the amount of incentive on tax dollars that we are working with. Not just the $7,500, but to push it up to a $12,000 tax credit.

I won't say much about that particular slide, outside of being -- our sales being an industry leader and first to market, as well as the companies that we are working with.

Ultimately, from a mission stand point, our driving efficiencies, driving costs down, leveraging volume to be able to do that, developing new business models with the customers that we are working with, with the infrastructure companies that we had here today and, as well, the individual cities that we are going through to ultimately attract the right customer.

A few of them you see here on this screen today. Certainly, these are not all of them, but these are six or so of our most accredited customers, and I think they each bring a different perspective, a different drive pattern, a different customer to the market, and they have certainly stepped up and not only purchased products and are involved

with the DOE, but also want to help us see that the product is given on time and giving them great success for their name, and for our name as well.

Our Kansas City facility, as I mentioned to a few people earlier today, it's a 600,000 square foot facility. We currently take up 80,000 square feet, so there's plenty of room to grow and we have intentions for doing that.

That did come online, delivering product, the first product rolled out of there September 21st,, which was a few weeks ago, and we have a significant amount of product that we'll roll through the rest of the year and then early into 2010.

And the last slide that we've got on there really shows the transit connect, as I've shown already. Staples, for example their vehicle, DHL, some of our normal long-standing customers. You see a dump truck that's on there. We do make busses in Europe and have intentions to bring those as a fully electric battery -- fully battery electric vehicle into the U.S. market in 2010.

And then certainly the last one, which you will see running around on the streets of San Francisco in the not too distant future, is PG&E's all-electric bucket truck, which is the first not just for the nation, but the first for the world.

So with that, we thank everyone for being here

today and thank you for your time.

MS. BAROODY: Thank you very much.

(Applause.)

MR. OLSON: Mark, I have a question, this is Tim Olson.

MR. AUBRY: Yeah.

MR. OLSON: Do you consider these projects demonstrations, these are not really commercial applications at this point, commercial sales or are they -- how do you describe them, are they demonstration, are they deployment of commercial vehicles, what's your --

MR. AUBRY: I think how we take them and maybe how our customers may take them, or how you may take them may be three different options, so I don't know if there's a right answer or a wrong answer.

For ourselves, we truly, from a customer's perspective and from our perspective, we would say that these are not demonstration to see if they work; we know that they work because they've been in customers' fleets already up to this point.

From a Department of Energy and that money that's been given, it is for a demonstration of can these vehicles work, how are they working in this particular atmosphere?

In this case, you know, the San Francisco Bay Area, what applications are they being put in and that data

that's received out of it.

So I think any of the infrastructure components that we put in, that will certainly be a demonstration because up to this point no one in our field has gone out and done that in mass format, so we need to see how they work, what they work well with, and so on.

MR. OLSON: And are you open to your electric drive version of this, but for non-petroleum fuel platform, so that would be more of a prototype demonstration?

This is the nature of a solicitation we're about to put on the street. In essence, we want to go beyond diesel and gasoline and look at natural gas, maybe ethanol, pure electric, in essence, kind of hybridizing other fuels.

MR. AUBRY: I certainly wouldn't say no to listening to what you have to say.

MR. OLSON: One other question, of your partners that are kind of the host companies for these vehicles, can you give us any information, if not today, some information on how many in California?

MR. AUBRY: Sure.

MR. OLSON: How many of these would be interested in California?

MR. AUBRY: What we've committed to in 2009 and early 2010 is 150 vehicles of the Newton platform. We have not made any public statements for the Transit Connect,

partially because Ford's got their hands in that, as well.

What we've said publicly is there's a significant amount more products to be deployed in New York, in Texas, in each one of those states that I mentioned.

But specifically California, on the Newton platform, a minimum of 150 into 2010, and then once the Transit Connect comes online it would be more vehicles than that.

But specifically using the Department of Energy money and the cost matching would be that 150 first deployment.

MR. OLSON: And would you do any of your projects here in California, would you do any manufacturing assembly here?

MR. AUBRY: Can I take that off the record?

MR. OLSON: Sure.

MR. AUBRY: No, most of our components are made here in California. So although the vehicle, itself, is not assembled here in California, or final assembly is not made in California, a number of our components are made here, as well as the work force. I think that would be worthwhile for us to spent more time and go through, that that will be the -- that initially will be the phase.

And then ultimately where we would see it is having some representation here in California from an

assembly plant perspective. And I think that's where we would want to go offline with you.

MR. OLSON: Okay, thanks a lot.

MS. BAROODY: Thanks Mark, appreciate it.

Okay, next up we have Bob Hayden with the Bay Area Electric Vehicle Corridor Program.

MR. HAYDEN: That is me, thank you. Good afternoon, I'm Bob Hayden, I'm with the San Francisco Department of Environment.

Today I'm talking really about the regional activity we have going here in the Bay Area, and it's going to be a little bit different nature of a presentation than what you've heard and we've been talking about so far today, which is focused and presented from the stand point of technologies and products.

I'm really going to focus on just really more of process questions, the types of things that we're trying to make happen here in the Bay Area to deal with the types of questions, and challenges, and opportunities that we've all been talking about here.

We'll get down, I think, to more specific brass tacks with the next presentation, with my colleague from Sonoma County, who will talk a little more directly about some of the projects that are going on in at least one of the counties within the region. But I want to give a notion

of how we're trying to tie it all together.

And in that regard, the first thing I want to emphasize is that the Bay Area EV Corridor you should not think of, necessarily, a physical corridor of charging stations, it's really a project. It's an effort to do just what that subtitle says there, of bringing together and creating a network of EV-ready communities.

Certainly, it will include corridors and clusters of charging infrastructure, but that's really only part of it.

The program, itself, has two major legs to it. One is the Gov-to-Gov Working Group, and you've heard Gov-to-Gov referred to by a number of speakers already this morning, Commissioner Chong and some others have mentioned some of the meetings that we've had through that group.

That is a very diligent effort that we've made to bring together the relevant local county, regional government officials from the nine-county Bay Area, so that we have one place where we have all of the permitting people, the fleet administrators, planners, others who have some kind of official governmental role that's going to have an impact on getting the community EV ready in many different dimensions of what that term means.

So that's one effort of getting the government officials together so that they have a place where, as much

as we love the vendors, sometimes we need to be just, you know, have a little bit different environment to talk, and think, and scope out what the policy dimensions are.

But we do need the private sector collaboration as well, and that's the second leg of the effort. The private, the public/private collaborative activity takes places as sort of parallel effort, and that has started up really more recently than the Gov-to-Gov activities.

But through the public/private collaboration we're finding a space, a location, a venue, a mechanism by which we can bring together that government-to-government representative group with members of the private sector, both vendors and producers of vehicles and infrastructure, but also private sector in the sense of large employers, people who -- companies who can become involved with encouraging their employees to become involved with electric vehicle consumption, private fleets and so forth.

And also the nonprofit advocacy groups within the Bay Area, try to bring all of them together.

And through those two parallel efforts, really, that yields the regional planning activity. And that planning activity you see in an off-centered oval here at the bottom, and that's intentionally off-centered just to point out that the bulk of regional planning comes naturally from the governmental sector, but there is an intersection

with and an input to that, obviously, from the private sector. So that's what we're bringing together through this collaborative effort through the Corridor Program.

As I said, the Gov-to-Gov activity is focused on just the government officials. I mentioned the nine counties, on top of that there are three regional agencies that have been involved, the Bay Area Air Quality Management District, the Metropolitan Transportation Commission, and the Association of Bay Area Governments, or ABAG.

On top of that we have over a hundred cities within that nine-county region, and they range all over the lot in terms of size, and interest, and demographics, the largest of course being San Jose, Oakland, and San Francisco, but there are a host of medium and some very small and rural cities that fit within that nine-county region.

So they're not all going to come in at the same level and so far we've had about 40 jurisdictions from that nine-county region that have participated in the programs, and that's growing all the time. I'm really impressed, myself, I never thought we would be drawing in that many from the beginning. I think it's a measure of the interest and the recognition that this is a time to really start learning.

And learning is a big part of it. One of the

things that needs to happen, I have just really, really come to realize, is not just bringing together the government officials to compare notes on how to get consistent policies in place and how to do fleet orders, or something of that nature, but it is basic education.

And the types of things that you are hearing here today, that we are talking about, is completely new to most of the local governmental people who have to deal with it, and there's a great deal of education that needs to take place.

So by the fact that we are bringing these people together, we're setting up and will be setting up common websites for them, and areas, meetings, and workshops where they can learn about specific types of projects is extremely valuable and I think is going to accelerate the process for bringing the vehicles into this region.

And this region, I just want to emphasize, also, the importance of this nine-county region, there are more than five million vehicles registered within the Bay Area, so we do have, obviously, a sizeable market, in addition to a very eager environmentally conscious market.

As I'm sure you know, this is one of the highest concentration of Prius markets in the country and any other measure of consumer interest in environmental products, San Francisco Bay Area ranks at or very near the top.

Within just, again, the structure of the way this Government-to-Government Committee works, we have pulled together, on an informal basis, a group of us who serve as sort of the steering committee, and there are representatives, including myself and our fleet manager from San Francisco, but also representatives from Santa Clara County, and San Jose, Alameda County, Marin County, and Sonoma.

So it gives a good, those of you who are familiar with the geography, we've covered the basis pretty well in terms of those who have taken the most active interest in spearheading the activity.

On the private sector side, equally impressive I think, in terms of the level and number of stakeholders who are involved with this. The group that has stepped up to serve as sort of the host for that private, public/private collaborative meeting ground is the Bay Area Climate Collaborative.

And I'm going to go through a little bit of alphabet soup here, but the BACC is a relatively new organization, a new compact that was pulled together by some of the leading business organizations and some of the biggest governments within the Bay Area, over the past year, to work specifically on a variety of climate-related topics.

Electric vehicles is one of their identified top

areas and they have formed an EV working group. That EV working group serves as that meeting ground, I'll call it, for the public/private collaborative activity.

The collaborative, that Bay Area Climate Collaborative, is made up of -- from the business side, the principal players are the Silicon Valley Leadership Group and the Bay Area Council. They're supported, also, by the Business Council on Climate Change.

Those three organizations represent, really, the powerhouses of the business sector within the Bay Area, and for them to be involved with this gives us a great deal of horse power for not only sort of bringing about and providing an advocacy base that we're going to need, ultimately, for whether it's public policy or anything else, but it also provides an inroad for us, a pathway back to some of the major employers throughout the Bay Area.

So we're getting input and we're getting an avenue for going back out into the business community.

And there are other major stakeholders who are involved with this. The Clean Cities Coalitions, of which there are three in the Bay Area, have been associated with this whole EV Corridor Program, and supportive of it.

We had a workshop. I mentioned that we're doing educational programs for stakeholders, including the government officials throughout the Bay Area.

Last month we had a workshop in San Jose on electric vehicle charging, just the basics of how it works, what it means primarily for fleet operators. That was sponsored, actually, by the San Francisco Clean Cities Coalition.

And throughout our program we've had tremendous support from Electric Power Research Institute, and PG&E, all of whom -- both of whom have provided sort of technical resource and been informational speakers at our programs. Bay Area Air Quality Management District has been actively involved in a variety of ways, one of which ties into this next item that I want to talk about, which is one of the obvious areas that the collaborative group, specifically the Government-to-Government group has been involved with and will increasingly be involved with, and that's with public charging.

I'll explain how the Air District was involved in just a moment, but just the whole, the breadth of the activity in terms of the public charging work that is beginning to be done, started up over the past year and is really picking up in acceleration, is looking, obviously, at the point of upgrading the old generation one chargers, that's the very easy starting point.

But we're working on how to come up with strategically placing of a new network of level II chargers.

And consistent and at the same time with that, coming to grips with what some of the basic policy questions are, as a local government there are lots of things that come up once you start putting public charging particularly onto publicly-owned property.

Is there going to be billing for the electricity? If so, who collects it, how's it done? How do we make sure that even if there are prescription systems that it is universally accessible, and Richard Lowenthal addressed that this morning. Lots of other issues that may come into play as we look at this from a public perspective.

And it hasn't really until, I would say very recently, started to sink in, I think, to the planners at the local level that that public charging also has the dimensions for fast charging associated with it.

Not all DC fast charging is going to be on public property, but it certainly fits in with the public planning for how we deploy that infrastructure, so all that gets wrapped up into what we're doing on the charging side in the corridor activity.

We got immersed in that, really, a little sooner than I think any of us would have liked, just because of the timing of the stimulus funding that came out, just at the time that we were really getting our organizational efforts together.

But when the Clean Cities opportunity came out, we all raced to put together the types of not only vehicle procurement, but the charging infrastructure that we thought we'd like to get funded under that project.

We weren't successful, but it was an extremely valuable process. We didn't get the grant, but it laid the basis for a lot of things that will be moving forward.

The Bay Area AQMD, which I mentioned earlier was involved with this charging activity, they stepped up to be the regional coordinator for that grant, so that we did send in, to the Department of Energy, one regional grant.

I'll have to say that the work that went into putting together that proposal didn't have quite the kind of elegant planning process behind it that I would have liked, and I think that we'll have going forward with the luxury of a little bit more time and experience. But because everybody had to move so quickly on that, the different jurisdictions just went out quickly and found the areas where they thought they wanted to put public charging in place.

We didn't have time to really do thorough studies of is that the best place, and all of that, but individually as jurisdictions we came up with our thoughts of where at least we want to put our marker down for where we're going to start putting in the new generation of EV charging

systems that are publicly accessible.

And it was pretty incredible when we added it all up and saw that over a hundred different locations throughout the nine-county area, and over 1,100 charging units within those hundred areas were being proposed.

So again, even though we didn't get that funded, it provides a starting point for where we will go back. All of us are now at the point of trying to think about is that really where we want to do it for the next round of funding? Is that what we will be asking for? Maybe yes, maybe no, maybe with some modifications, but it gives us a good starting point for moving ahead and with knowledge, now, somewhat more of what those policy issues are brings together a whole planning -- set of planning activities.

But one of the main things that I want to emphasize is that what we're doing through this corridor project isn't just the charging infrastructure. Obviously, it also includes something that we've talked about here this morning, the whole process for expediting the home charger installation process, making it a smooth, quick, painless process so that consumers don't get discouraged by lengthy delays.

That is something that we want to have happen not only city by city, or county by county, with their each individually coming up with ordinances, policies, programs,

but we want to do that as much as we can on a consistent basis throughout the Bay Area.

So that if you buy a car in San Jose, it's going to be a similar process to buying one and putting your infrastructure in place in Marin County. Make it so that people, because they aren't just going to buy in their community, necessarily, they will be moving around, but we want to make it something where we've streamlined the process from a governmental stand point, in terms of the permitting and the inspecting process.

We're putting together training programs for the building inspection people and keeping them up to date, even as they have turnover in personnel, of doing training for some of the installers and even people at the dealerships, so that we're all on the same wavelength of what type of package of information consumers need to get and how to make it an easy process for them.

Another area that we're focusing on is in the concept of the multi-family buildings, and I lump into that, at least for this purpose, workplace charging. Because in both cases we're dealing with property owners who have a different set of drivers.

Now, they're not buying a vehicle and need to get a charger in for themselves, they're thinking about or we want them to think about putting charging infrastructure in

for others.

So we're trying to come to grips with how we get programs going to motivate those property owners and work with them, and make it easy for them as well.

I mentioned a fleet before, and one of the great benefits of this Government-to-Government activity is that we have been getting the fleet managers together in a very focused way that they have never done before, of talking about specific types of vehicles.

They are comparing notes, finding out what vehicles are available. They're looking at ways where they can, if not do pooled orders, maybe they can do some sharing of demonstration vehicles, do tech training for their different fleet management people, where it's all consistent and they're working with the manufacturers.

But that's a very active communication area and one that I think is going to accelerate the way in which we get the vehicles into the fleets within this region.

A bunch of others, and I've put down here in one box just the new building wiring, we've talked about that today, that's something very much on the radar screen of getting ordinances in place consistently throughout the Bay Area, that will require new buildings to have, in their parking facilities, wiring that can make them EV ready.

Working with private fleets is another area where,

again, working with the Bay Area Climate Collaborative and the private sector partners will have a big impact.

Solar charging, we're working. Individual cities have looked at this, but we want to try and figure out how we can do this on a broader way throughout the Bay Area, of having solar or other renewable, probably solar, but could be any renewable systems tied in with charging facilities.

And obviously we're all now, this is a big learning curve for people, all of us, but certainly most local officials, the whole concept of integrating Smart Charging or Smart Grid, what is the city role, or local official role, what do we have -- what should we be doing about that?

And there are some areas, some jurisdictions within the Bay Area that have municipal utilities, and PG&E serves most of us, and we are talking to them and want to work with them as much as we can, be helpful with them. But we also have, within San Francisco, the San Francisco Public Utilities Commission that provides electricity to the City functions and all of our muni buses.

The City of Palo Alto and other cities have municipal, local municipal utilities.

So we are looking for ways that we can have all of our officials educated on what the needs, opportunities are for us to work in that area.

And just another area that I think is not often thought of, but this whole concept of workforce development, which includes everything from green collar jobs to very specific training programs, as I think Peter mentioned this morning, the grants that came out for the Workforce Development Program and here, in the Bay Area, we did get a several hundred thousand dollar grant that includes within that electric vehicle infrastructure workshops for going consistently through the counties for doing the training programs, to do the type of work highlighted in that box on the top row on expediting home charger installation.

So we've got to start at doing that proactively in the Bay Area, through the Workforce Development Program.

We've had at least two major stakeholder meetings, which I would now call the Public/Private Collaborative, and we've had three meetings of the Government-to-Government group. We're aiming to have quarterly meetings, at least, of the Government-to-Government group in a large sense, and probably more frequent or between the quarterly meetings, anyway, there will be subgroups working on the different types of boxes -- or issues that I had highlighted in the boxes on that previous side.

And so, finally, I just want to wrap up by saying that in terms of AB 118 and what we could do with the CEC, obviously, we're going to be coming back to you, Peter and

Tim, and all of you, with applications for specific projects, and help with infrastructure, and vehicle procurement.

But there's another aspect to it that I think is extremely valuable and can help leverage your dollars and leverage our efforts, and that is if you can just give us support on doing this type of regional coordination, perhaps by establishing some level of prioritization. You get extra points if you can show that you're doing some of this regional activity and coordination, for creating a regional market.

And perhaps there would be ways that we can actually apply for funding, to you, for supporting some of the technical and basically staff work for carrying out some of this regional funding.

But through the program and infrastructure development part of the AB 118 funding, I think it would be good if we could be creative to think how we could support some of the regional activity through that.

So thank you.

MS. BAROODY: Thank you, Bob.

(Applause.)

MR. OLSON: So, Bob, I can't let you sit down without asking a question, first.

And I'd like to make one first comment. I've been

to a couple of your events and workshops and you have done exactly what you've said in your presentation, a very significant effort to get collaboration from lots of different parties, and it's really impressive what you've done so far.

MR. HAYDEN: Thank you.

MR. OLSON: I'd like to ask a couple questions about -- and I agree that we're thinking seriously about how to support regional -- if there's a group statewide that could do this, that would be great, but we think this is going to be more regional in nature when we're looking at setting aside money for this kind of activity.

And the more information you can provide to us on how -- this kind of refined information on where the customers are, when they're going to be customers, that type of thing would be really helpful to us.

And here's another thing that our Commissioners are looking at, to the extent, and whether you call it regional planning or regional collaboration, to the extent that you can help accelerate, not reducing any of the standards or the permit requirements, but make the permit process user-friendly, shorten the timeframes, accelerate that, that would be real valuable.

Given you've got a lot, you probably have the insights on how that process works with all of your members,

and there's got to be -- we think there's probably some ways of accelerating some of that effort.

MR. HAYDEN: Well, I think there are. It first begins by making sure that the national Electric Code -- not the national, but the application of the Electric Code, jurisdiction by jurisdiction, is up to date and fairly consistent throughout the region.

And it also involves having the permit officials just make sure they have a fast track process, to look at their systems and see if there is any fast track activity they can do.

A lot of the work, a lot of the delay I think, as I look at it, and it was some of the very interesting work that was done by -- presented by Nita Jaffe, of Clean Fuels Connection, in relating her decades of experience, or more than decades, at least, of experience.

It becomes evident to me that not all of the delay comes from the local jurisdiction side. A lot of the handoffs are between contractors, and dealers, and all of that, and when you add into that the permitting office and the inspector, it really gets to be quite laborious.

So we want to have a process in place where we start with the local government officials in the permitting and inspections offices, and then work with the car dealers, the infrastructure companies, and the installers to have

really a package deal in place for the consumers and try to put together a package of information.

So that if you buy a car in this area, you'll know exactly who to call, and what to expect, and how to get it done quickly.

MR. OLSON: Very good, thanks a lot.

MS. BARODY: Thanks a lot, Bob, appreciate it.

Next up is David Worthington, of Sonoma County.

MR. WORTHINGTON: Good afternoon, my name's David Worthington, I'm the Assistant Fleet Manager for the County of Sonoma, it's about an hour north of where we're located right now.

Peter, Leslie, Tim, thank you for inviting me to give a perspective from a user, which would be our fleet, and what we are doing in Sonoma County, appreciate your time.

Just a brief overview of Sonoma County, we have over 482,000 residents, we have over 1,500 square miles of land mass, 2,557 miles of roads, and most of the land is used for agriculture in Sonoma County.

Our fleet composition, we have 1,500 vehicles, they include light-duty vehicles, as well as heavy-duty, off-road equipment, tractors, trailers, pretty much anything and everything that you can think that a private industry would use we have in our fleet.

Of that, 950 of those vehicles are automobiles and light-duty trucks, 550 are medium- and heavy-duty trucks, off-road equipment and the such.

Last year our fleet drove 10 million miles. That does not include the hours of our off-road equipment. Of that, the vehicles that did drive on the road, we averaged 14.5 miles per gallon.

We've had a hybrid vehicle program in place since 2002, when we first started purchasing Toyota Prius's. Since we've had that program in place, they've driven 3,200,000 miles. We have saved 50,000 gallons of gasoline with that program and we've reduced our GHG emissions by 546 tons.

This last fiscal year, 2008-2009, that same hybrid fleet drove one million miles, saved 16,000 gallons of gasoline, and reduced our GHG emissions by 181 tons.

We currently have a makeup of approximately 201 hybrid and plug-in hybrid vehicles. Of that, the majority of them are Toyota products, but we're not Toyota exclusive, we have Honda Civics, we have Ford Escapes, and we recently purchased 14 Chevy Malibu hybrids.

We've had six of the Toyota Prius's converted to plug-in vehicles. We have two more that are scheduled within the next two weeks to be converted. We have seven of the Neighborhood Electric Vehicles that are produced by GM,

and we just took ownership of a Neighborhood Electric Vehicle truck made by ZAP.

What we are proposing in our next two years is to add 25 more Toyota Prius plug-ins that would be converted. We would like to add 50 electric vehicles, and five heavy-duty, either hybrid electric diesel trucks and/or plug-in hybrid electric/diesel trucks.

Some of the pictures here show you what we're talking about, the Toyota Prius's, as far as being converted to plug-ins. And then we have in the middle the Nissan Leaf, the new EV product that should be out in the market by the end of next year, and then a hybrid diesel bucket truck that we are awaiting delivery on right now.

Our current electric vehicle infrastructure, we've been working on it since October of last year when we took the delivery of our first plug-in hybrid Toyota Prius.

We have five level I charging stations in operation, they've been for the last couple months. Four of them are located on county-owned property in Santa Rosa, around our county center. We have one located at the Northern Sonoma County Air Pollution Control District. That is not publicly accessible. Four of those are accessible to the general public.

Four of the five are wired for 220 volts, for level II. When we went to install the infrastructure at

that time, we realized the importance of providing level I and level II wiring needs, so in the near future we could go strictly to a level II if the vehicles became available in a timely fashion.

So when we installed the infrastructure we ran the wires so we could have more charging stations installed in the same location, and/or run a combination station, which would be a level I and level II station.

Right now we're waiting for two more level II charging stations to get past landlord permission, because these are on leased properties. We are working with our real estate department with a lot of our landlords that we lease property from, and starting the conversation of would you be willing to allow us to install a charging station?

Due to the makeup of the County and the different departments, we do lease quite a bit of office space. As programs expand and we need more room, it's much more cost-effective and quick for us to react by leasing a building, than it is to purchase or build.

What we have done, what we would like to do, we've requested of $150,000 through the Department of Energy Block Grants. If we're successful in achieving that funding level, we will add five more level I and level II charging stations, combination stations in our motor pool parking lot. These ones would not be accessible to the public, but

they would be used strictly for recharging our motor pool, which would be either plug-in hybrid vehicles or pure electric vehicles.

We would ask for six level I/II charging system combination systems accessible to the general public in highly visible locations around the County Center.

We have been placing our charging stations right now in a combination of the best visible station for the general public to be able to see what the County is doing, as well as based on what voltage is available within the buildings in our County Center.

We do have a number of buildings that are well over 60 years old, so we have run into challenges as far as infrastructure on the electrical panels, wiring, things like that.

We would make two more level I/level II charging stations accessible at our Sutter Medical Center and Hospital. We would also make two more accessible to the general public located in industrial parks near the airport, Charles M. Schultz Airport, in Sonoma County.

Sixteen of the 22 charging stations would be accessible to the general public. We believe it’s critical that stations that are made available to the general public are in locations that they will physically use. It is of no use to have a charging station where people really aren’t

going to go.

We're trying to work with private industry within the County to identify those companies that are willing to invest in the infrastructure, side-by-side with the County, to try to make a program within the County where there's enough charging stations to get from one end to the other without any problems whatsoever.

For 2011 and beyond, we were planning for a minimum of 80 level I and II combination charging stations by the end of 2010. Regionally, a minimum of an additional 90 to 100 level I and level II combination stations to fulfill the needs of the local Sonoma County government, as well as those involved in the EV partnership, which includes the County, the Sonoma County Water Agency, and all nine cities located within Sonoma County.

Again, a majority of these charging stations would be accessible to the general public.

Capital costs. It's been our experience so far that the average cost of installation of a level I charging station, with pulling additional wiring to make it into a level II, is $10,000 per station.

It's an approximate estimate because we've been very diligent in using our funds in a wise manner. We have used, supervised adult crews to do some of the infrastructure installation. We have tried to look at the

different areas within the County and separate them out to a station that would be installed very close to electrical outlets, to one that is 300, 400 feet away, to get an idea of what the costs are and how they vary from installation to installation.

The average cost of a level I and level II combination charging station is estimated between $3,000 and $4,000.

The units we currently have are the Coloumb units that Richard sells, been very happy with them. The pricing is different depending on if the unit has the cell phone module in it or not, because it's a daisy chain system of one being able to see the other, you only need one that has the cell phone module in it to link up and send the information.

The costs for level III were estimated at $25,000 per unit for installation costs. We're basing that on what we are currently paying to have infrastructure installed to meet the diesel regulations of on-road and off-road. We are doing diesel retrofit kits and some of those kits are plug-in styles, and require 220 volts, more than 30 amps.

So we've been looking at what our costs have been to install those stations, where they're located, and extrapolating that into level III costs.

The cost, obviously, is reduced if you're doing

multiple installations. If you're just doing one unit, it's fairly expensive, it's towards $10,000. If you're doing two, you've already trenched, you've already run the lines, you're just running additional wiring, the incremental costs are much less.

The cost estimates are based on Sonoma County owning the property where the charging stations would be installed, and/or lease agreements with landlords that we have worked out, where they will allow us to install the systems on their property.

The regional cost estimate for doing 180 of these charging stations in the County on City-owned and County-owned property would be $2 million. Right now it's fairly hard for us to estimate what it would be for a private industry to have the land put up and to pay for those charges.

We are trying to get, from our local EV group, a commitment from large companies within Sonoma County on how many charging stations they would be willing to place and trying to negotiate who would install them, who would maintain the data and all the other nuances of the charging stations.

What we need or what we're asking for in support for this to be successful in Sonoma County, as well as across California, and this is based on what we've seen so

far and what we believe needs to happen to make an EV rollout successful, right now at most we have a year and a half before we're going to have quite a number of EVs in the marketplace and without the infrastructure in place before they arrive, we could go back to the 1990s with the EV I and the results that came from the public not having access to infrastructure.

Right now the immediate thing we need is a SA agreed upon standard for the level II and III connectors.

We also need immediate funding made available to begin the infrastructure installation now. We don't have the luxury of waiting six months or eight months to start the installation of this infrastructure.

The permitting process, the looking at the buildings, assessing what voltage is available, where you can physically install it, ADA requirements, and everything else, the process can be lengthy and we need to begin installing infrastructure now to have it completed by the time the EVs roll out here at the end of 2010.

Funding for the conversion of hybrid electric vehicles to plug-in electric vehicles, we see this as an area where you can gain an immediate fuel consumption decrease, emissions decrease, and act as a bridge before the manufacturers introduce their own plug-in hybrid electric vehicles alongside their electric vehicles.

This is a technology that we've proven, it's immediate, we can get it done right away and start using those vehicles.

I drove down in one of our plug-in converted Prius's today. Last night I checked to see how much we charged it up with and it was 5.3 kilowatts. That cost our County 48 cents to recharge that battery, to gain a 20-mile-per-gallon fuel mileage difference.

And across our fleet of the plug-ins we're averaging a 20-mile-per-gallon fuel increase on the vehicles.

If the person that is driving the vehicle is a little bit more attentive, we can get even greater fuel mileage savings on the plug-in electric vehicles.

We are looking for funding for the differential costs between plug-in -- or between hybrid electric vehicles, standard vehicles, to go to all-electric vehicles or plug-in electric vehicles.

We've been very fortunate, my manager, Dave Head, has had a replacement program in place for a number of years that funds the replacement of vehicles between three and seven years, depending on what type of vehicle it is.

We're not looking for the full cost of any of this new technology, as much as the incremental cost of what we would have already been purchasing.

We also see an immediate need for the standardization of local and regional permit processing for the infrastructure.

Bob's spoken about it, a lot of people here have spoken about it, the permitting process, alone, needs to be streamlined for fleet operators as well as customers to be able to get the infrastructure installed right away so you have no buyer's remorse.

Regulatory changes, right now that is something that needs to be discussed, needs to come to a conclusion on what direction we would go with that as a State, because as a fleet we are looking at the amount of usage for each vehicle so we can track it and look at our overall costs.

We need to know how much we're paying for electricity and what we're getting in fuel mileage on these vehicles. In order to do that, you need the data. The data's great, but if you're being charged more than what you were physically using then it skews the results and it can, in some cases, make a plug-in electric vehicle or hybrid electric vehicle -- I'm sorry, a full electric vehicle look not as cost effective as it should be.

We've proven over the last seven years that a hybrid electric vehicle is cheaper to maintain than a conventional gas vehicle. From start to finish, we have had a lower lifecycle cost on hybrid electric vehicles than a

comparably sized gasoline vehicle, and that's been across the board for us.

In order to expand these cost savings, we need to know how much energy is being put into these vehicles and at what cost.

The abilities of users to charge at different manufacturer charging stations is also something that we see is a potential problem. We need a system in place that is similar to your cell phone in roaming charges. We need to have a customer that can get from the Bay Area using whatever charging system station happens to be available, come up to our County, use a completely different charging system station and not have to call different companies, have two different accounts, have two different bills sent to them. We need it more centralized so a customer only receives one bill at the end of the month, one statement. And it could be from various charging system companies that would be sending that information through to the company that they happen to have an account with.

We also are looking at training programs to educate our current technician workforce. This information is coming at our current workforce faster than they have the ability to keep up with it. Instructors and trainers are having a hard time keeping up with the technology.

I tell our techs all the time the changes they'll

see in the next five years will dwarf the changes they've seen in the transportation industry over the last 25 years. They will not recognize what this industry looks like in five years.

Because of the accelerated process that we're going through in this industry, we need to be able to keep up or at least try to keep up with training for the technicians.

Future of EVs in Sonoma County, we'd like to see 200 plus charging stations in the County, that would allow the customer to go from one end of the County to the other without having any range or mileage anxiety. We'd also like to see that go beyond the County and come down into the local Bay Area.

We'd like to be able to have anybody from the Bay Area come to Sonoma County and know they can get there in an electric vehicle, as well as anybody in Sonoma County get to the other end of the Bay Area without a problem.

Thank you.

MS. BAROODY: Thank you.

(Applause.)

MS. BAROODY: Thank you, David.

Any questions for David?

MR. OLSON: David, I wonder if you could just clarify your proposal for 80 level I/II charging stations by

the end of 2010 and additional to a hundred. Is that for County purposes, mainly, or is that other -- does that include the potential demand from individual owners, corporate, other entities?

MR. WORTHINGTON: The 80 would be just for Sonoma County's fleet operations right now. We're basing the numbers based on how any electric vehicles we would have at that time, as well as plug-in vehicles.

The additional 180, up to 180, would include the other cities and government entities in the County.

On the private side, we haven't been able to nail down a good estimate of how many charging stations would be necessary. I think it depends a lot on the EV vehicles, when they come into existence, if they're going to be sold with the charging station or not.

It's been our estimate, which is rather high listening to the panel today, that we should have two charging stations available for every vehicle.

In our County, because of how it's spread out, the topography and everything, I think reasonably we need to figure on two charging stations per electric vehicle in our County.

MR. OLSON: Very good. One other question on -- well, it's a comment, that if you're not aware of this, the Energy Commission, very shortly here, will be putting out a

solicitation rebate solicitation for the A123 conversion, Prius conversions. It's the one company that -- just like you use the same standard, you got to have CARB certification you got to pass, it's a rollover safety test, and one company has that -- meets that condition right now, at least for the near term.

And so we're going to provide -- we're going to provide, basically, the full incremental cost difference for those conversions.

MR. WORTHINGTON: That's great, that will go a long ways. There's a lot of other cities and county agencies in California that have actually been asking to buy our plug-in hybrids from us once we're done with them. We've been selling some of our hybrid vehicles to other counties and cities based solely on the information we've provided them on the fuel mileage savings. And that would go a long ways to saving fuel and getting more of the plug-in hybrids out into the marketplace.

MR. OLSON: And for the record let me, I want to correct myself in stating that A123 Prius conversions are not certified by CARB, they have a waiver for the certification process that's underway.

MR. WORTHINGTON: Yes.

MR. OLSON: In case someone from our sister agency is listening in.

(Laughter.)

MR. OLSON: Okay, thanks a lot.

MS. BAROODY: Okay, any other questions, anybody?

Okay, thanks David, appreciate it.

Well, we're reconnecting our online audience, because the phone hung up on them.

(Technical difficulties.)

MS. BAROODY: Yes, if the morning panel would like to find more comfortable seats, that would be great.

MS. BAROODY: Okay, let's see. Oh, welcome to the afternoon panel, as you can see we're about an hour and a quarter behind schedule, so I'm sure we won't be leaving here at four o'clock.

Once they're set up there, we'll have Mark Duvall, of Electric Power Research Institute, speak.

Okay, are we ready to go?

MR. DUVALL: If I speak really loudly into the computer will they be able to hear?

MS. BAROODY: Welcome, Mark.

MR. DUVALL: All right, thank you, Leslie. I tried to sell half of my speaking time to the other speakers for $5 a minute, but they were worried about that being inappropriate. But I am going to try and just take a few minutes to talk about some things that EPRI's definitely studying at full speed on infrastructure.

I'd like to echo some of the urgency of the last couple of speakers, there's a lot that is knowable, but we don't know it yet and there's a lot of, I think, decisions out there to be made that are data driven, that we don't have the data for.

And all I can do is point a few of those out and hope that we get there as quickly as possible.

So, you know, I'm going to just say we had a lot of speakers in the morning, a lot of the infrastructure companies are brand-new to this field, there's a lot of energy. You know, it is really clear that we're seeing some major, major production plans unfold. This is all happening, I think that there's not much uncertainty about it, and we're still waiting to hear from some of the biggest players in this industry, like we still don't know what Toyota's going to do, we still don't know what Honda's going to do, those are two of the biggest hybrid manufacturers in terms of production.

So I mean we are hearing -- you know, there's just really a lot happening.

I don't think it is possible to understate that as much as it's happening, it's going to happen relatively slowly. I'm still waiting for permission from Southern California Edison to show you what I believe is the best current study on how many vehicles there could be over the

next five years. There's no problem, I didn't give them any notice so it's okay, Doug.

But, you know, in the end best case and achievable scenario is not more than a million and a half vehicles by 2015, electric vehicles and plug-in hybrids. And probably the Administration's goal of a million vehicles is achievable, but extremely challenging, and that's if you assume that by 2015 means by, say, Christmas of 2015.

So that said, and that's important for the last slide, we just completed a major study on the carbon impact of electricity in California. Electricity's a very low carbon fuel, even if you look at what's on the margin, and it is important to note that we've been studying the environmental impact of electric transportation both nationwide and in defined regions, like California, for a long time.

And the single dominant factor of achieving the greenhouse gas reduction benefits of electricity is not how much public infrastructure is available, or how good the vehicles are, or how clean the grid is. The dominant factor is how many vehicles do you have?

So if you come at this from the automotive industry stand point, they need volume to make this work. More than anything they need volume.

The environmental assessment points very clearly

that the number of vehicles is the dominant factor driving the environmental benefits of electric transportation.

There's a social benefit as well, and that social benefit is also driven by the number of vehicles, as long as they're good vehicles. I mean, and I would define good very loosely as saying they displace a reasonable to significant amount of gasoline consumption with electricity and they drive the market forward, meaning if you buy an electric vehicle and your friends ride around in it, and none of them ever want to buy an electric vehicle, that doesn't meet my definition of a good vehicle.

But most of the vehicles that were made in the 1990s did meet that definition. People rode in them, knew people that had one and also wanted one, so they drove market adoption.

Let's talk about peak impacts for a little bit, mostly because we'll have to deal with it at some point.

There are a lot of ways of looking at the power demand for charging prior to any sort of future scenario where there is Smart Charging, either because of aggressive action by third parties, or by utilities or others to get people on what I would call very good productive, off-peak charging behaviors.

And you can look at it two different ways, you can roll it up to the high level, what is the impact of

generation, it's relatively modest and always will be relatively modest.

Some of our work runs in at about maybe you're looking at a peak demand of 700 watts per vehicle, so for the first million vehicles in California you would be looking at 700 megawatts at more of a T&D level. Okay, not a big deal. But certainly, if you could avoid that 700-megawatt peak you would, and you can.

However, there's a lot of -- so even this assessment, which represents three to four months of work by some of EPRI's experts, is not the entire story.

Some of our colleagues correctly pointed out, well, why don't you look at cars that are -- why don't you look at cars that are newer than seven years old, because the newer cars are more likely to be in conventional commute patterns, they're most likely to arrive home during peak times, and things like that.

So we have to do more work in this area, as well.

But if you look at the local distribution impacts, they roll up very quickly to the house and what you can see is the distribution system is designed for the loads that it has to provide today, otherwise it would be inefficient. If you were throwing a lot of extra capacity into the system, rates would be higher than they are today.

So what you will see in general, and this is

especially true with pure electric vehicles, especially true since we have essentially agreed that we would move the level II charge standard from about 7 kw up to as much as 19 kw.

So you can go into a residential level II charging scenario and draw 19 kilowatts. And Tesla has already built a vehicle that does towards that end.

Okay, if you go there, you'll have impacts right away. Now, what does that mean? Well, that means there's upgrade work to be done. The utilities have an obligation to serve and they can't let a neighborhood sit without power because someone bought a Tesla or bought another electric vehicle.

And so there will be upgrades. And you'll hear EPRI talk until the cows come home about Smart Charging, about fully integrating electric vehicles into the electricity system, using them as distributed storage and all these great things and, really, all of those things are designed around minimizing those upgrade costs. That preserves more of the social benefit of electric transportation and ensures the highest likelihood that the ratepayers are made whole or that there's minimal impact to rates.

And in some future, rosy scenario maybe we could even get to the point where these things are putting

downward pressure on rates, they are improving utility efficiency. And if you get to a scenario like that, it means you're doing so many right that you're also creating a dramatic reduction in fuel consumption, so your refinery capacity, imported petroleum dependency, all these things are down.

So that's a really good future world, if you can get there. But it starts, it starts by using the storage capability of plug-in vehicles in an intelligent system to create very good charging behaviors.

But always keeping in mind that those charging behaviors have to meet the needs of the users, we'll get nowhere by attempting to impose on drivers when they can charge.

And I've heard lots of scenarios out there, well, you can charge when there's surplus renewables, because then they would be zero emission, or you can charge at this time.

You have to draw two circles on a piece of paper, that one is the needs of the driver and one is what is optimum for the grid and you have to overlap them as much as -- you have to find out where that overlap is and you have to operate there.

I've shown these before so I won't go into it in detail. But there are significant grid impacts, especially at the feeder level or the local level. They're highly

manageable. If you can distribute the energy provided to the vehicles over a -- the nighttime charging domain, you can really manage the impacts.

This dos save you locally. You know, this helps, but if you have a 25-kilowatt transformer serving five homes, and one of those homes adds an electric vehicle at five to ten kilowatts, it will create local stress and that stress will -- and that will have to be compensated for by he utility.

Okay, I'm going to -- I'm going to finish with the Charging Pyramid. And it's important to note a couple of things. First, I'd like to talk about standards, adoption of charging standards might be desirable but is, unfortunately, impossible.

Okay, the SAE Committee's responsible for this, having incorporated the input from multiple stakeholders in the auto utility supplier industry, government agencies, and they have arrived at a level I/II charge standard that is all but ready for validating and it's ready to go.

There is a small, but significant minority of those stakeholders that do not agree that that's the best standard. However, it is certainly good enough that electric vehicle adoption would never suffer for want of a better standard, so that standard needs to be put in place.

There was reference to a level III standard.

That's not actually correct, it's actually a DC charging standard. So the fast charging standard, and a lot of people call it the level III standard. Level III is technically still AC, whereas DC is actually -- the true fast charging is actually conversion of AC to DC, off-board the vehicle and then piped directly to the battery pack.

That standard is just beginning, okay, and I don't expect that by the time that some of the fast-charging projects that have been announced, like the eTec STDG&E demonstration, their last charger will probably be in the ground before that standard is finalized.

So it will not be possible in the near term to put in DC chargers and adhere to a standard. So we have to be careful that we understand what the retrofit or stranded asset implications of that might be, because any fast chargers that are going into the ground today are just going into the ground. And they will likely work in specialty situations. There's a couple of sets of intellectual property out there that are probably available for standards work but, you know, there's Aerovironment or AV has been putting in fast charging in industrial settings for a long time, they're very good at it. They have a set of connectors and a communication system that they like.

Tokyo Electric Power has done a demo in Tokyo and they've been active in California with their approach.

Probably either one of these would be the basis of a workable approach, but the point is that you can't create a standard by just pointing at that and saying we're just going to do that, that's a short-sighted -- that is a short-sighted approach, especially given the cost of these systems, probably close to $1,000 per kilowatt to purchase, plus $1,000 per kilowatt to install, very rough approximations.

It is especially not clear, with respect to DC charging, which auto companies will support it, will make product for it. The current demonstration that we're looking at, with SDG&E and some of the other things that will be announced, are very good ways to analyze how this works and to move on it when necessary.

We don't have enough debate, public debate about residential charging infrastructure. You have to understand where vehicles are and the majority of the vehicles is in this blue area, meaning they're parked at home. And when they're not parked at home, they're parked at work, which really points very directly to the efficacy of level I and level II charging as being a very efficient use of infrastructure dollars and pointing highly to privately-owned or company-owned infrastructure. Meaning I'm a homeowner and I own an EVSE and it's in my house, or I use 120-volt charging.

I am a -- I own a company with a parking lot and I have either level I outlets or some level II EVSEs for my employees to use.

Here, in these cases, one of the nice things about this is you have entities that are paying for and own an infrastructure that are highly aware of what they need. A company is only going to put in what they need and they can respond to that, so they will make very efficient use of their investment.

We tend to gloss over recently, and it is -- it's natural, it's almost a euphoric time, there is so much happening, and it all seems to positive that we tend to gloss over the idea that if a fleet does something, or a private company does something and it turns out to be the wrong thing, they may turn their back on electric transportation and no come back.

We all have a lot of experience in this area and we want to avoid that. So knowing where the vehicles are and then placing infrastructure there is very important and that is almost overwhelmingly home and work.

And then, finally, the cheapest solution for range anxiety is a plug-in hybrid vehicle. It doesn't mean that electric vehicles aren't a good solution, they are a very good solution. But if we force one technology to meet all driver requirements, it's not only expensive, but it's high

risk.

And if it's high risk and it's expensive, it will minimize adoption, which will tend to slow the number of vehicles out there.

We look like we're getting a variety of solutions, a variety of different automotive technologies from different companies, and that's a very good thing. And some of them will not work and, hopefully, most of them will find a way to be successful.

And then, finally, we don't have enough data to intelligently plan infrastructure deployment.

There was recently a cost assessment model released on infrastructure planning for businesses and municipalities that is almost irresponsible in its prematureness. We don't have enough data to do this, we don't have enough data to make these investment decisions.

We're getting there slowly, but an intelligent deployment has to maximize the benefit of a given investment. And, you know, some of the proposals that are out there for electric super highways will not maximize the benefit of those investments over, say, a residential charging installation program, or a program to encourage landlords to provide charging for their tenants, things that are relatively low cost, may consist solely of outreach or education that do maximize those dollars.

And then, finally, I would say a variety of ownership business models will probably co-exist and are probably necessary to figure out what works in the end.

Okay, and that's what I have for today, thank you very much.

MS. BAROODY: Thank you.

(Applause.)

MS. BAROODY: Thank you, Mark. Any questions for Mark?

MR. OLSON: Yeah, Mark, I'd like to clarify the 1.5 million -- you're saying the best case, 1.5 million vehicles, EVs, BEVs by 2010; is that a U.S.-wide number?

MR. DUVALL: Yeah, the study that I'm referring to, and we have a similar one in-house, looks at the first five years and makes what I think is a very good assumption, and I think most of the automobile industry would agree with you, that for the first five years you're supply constrained, your adoption is supply constrained, you can only have as many vehicles as get built.

And this is why manufacturing incentives, like the recent $2 billion boost to the battery and electric drive industry are so important because you have to make vehicles.

And if you look at what is logical achievable by the likely players, based on what they've publicly said or committed to in a sort of a consistent pattern, not pie in

the sky, someone pops up, you know, at an EV conference cocktail and says his company's going to make a million vehicles per year, but what looks to be logical. And if you look at that, you can get to about a million and a half vehicles.

It's probably not likely unless a few things change that you can get for more than that, so I would call that an achievable scenario. And I would call a million challenging, but doable.

MR. OLSON: So what do you know about the demand?

MR. DUVALL: I personally believe, from experience and looking at this market, the price of fuel will have no effect on selling those million -- let's just call it a million vehicles. It will have -- I think it will have very little effective on it. I think a million vehicles nationwide is no problem.

You might even say a million vehicles in California in five years will be no problem. So I think demand's not an issue, I think people are ready and I think there's a tremendous amount of interest.

MR. OLSON: Is there more demand than supply?

MR. DUVALL: I think that will be that way for five years and I wouldn't be surprised if it was ten.

Remember that eight years was a million vehicles for hybrids, eight years, and we spent the first half of

that with two subcompacts. So the idea that we could do a million vehicles with plug-ins in less than eight years is really, really impossible.

I mean, we don't know a lot about price, just what people have said, but there's this feeling that these vehicles are going to come on the market at a price of about 40,000 and carry a $7,500 credit, looking at about 32 to 33 thousand dollars.

What was the cost of the first Prius when it came out on the market?

MR. WARD: It was close to that.

MR. DUVALL: Twenty-eight. Yeah, so the 28 in 1999 or $2,000, so the price point is probably there.

For long-term mass production, no, but for that, you know, I think -- that's why I don't think it's that big a deal to dispose of that many -- that number of vehicles.

MR. WARD: Thank you, Mark, for your presentation. I think I noted that you might have left it ambiguous to Tim's question of whether or not it was California or the nation, but maybe that was on purpose.

MR. DUVALL: Oh, it was nationwide.

MR. WARD: Oh, okay.

MR. DUVALL: It was nationwide, I'm sorry.

MR. WARD: No, no, but then you followed up and said it could be a million in California, as well.

MR. DUVALL: I think if California had its own million vehicles, I think there's plenty of people in this room that would see that they get adopted.

But I just don't think it's -- I don't see how you would do that, I don't see how you would build that.

There's another point, not to be even more ambiguous, I mean I gave a presentation of how much data we need to get, and then I kind of throw sort of estimates out there like this.

But someone is looking into the capacity that has been funded, the battery capacity that has been funded through stimulus proposals, and they think that it's ultimately about 300,000 packs per year just from the stimulus funding. So there's some capacity going in, the future's uncertain.

MR. WARD: Uh-hum, and there may be some more coming from the battery manufacturing, hopefully. I'm hoping, anyway.

Great, thank you very much.

MR. OLSON: And, Mark, is there any -- do you have any insights about what might -- the rest of the world, what might happen, how that might impact the U.S., California, in terms of --

MR. DUVALL: Yeah, well, the rest of the world has disappointed me in the past. You know in Europe, there are

many countries in Europe that have much stronger financial drivers to adopt electric or hybrid vehicles and haven't done it, and diesel's not the only explanation.

And so one of the things is that people point to cost as a driver and they say cost, cost, cost, and I'm not sure that that's really the case, so it's a complex picture.

The U.S. was a big adopter of hybrid vehicles and now Japan is now a huge adopter of hybrid. Now, Japan was always there, but now they're -- you know, the Prius is selling like crazy in Japan and so it's hard to say.

You know, I was just in China, at the U.S./China EV forum that the DOE helped to put on, and they have this mass -- they're doing it the opposite of us, they're building from the bottom up, they're starting with electric bicycles.

And their key thought leaders think that they won't have any real highway capable technology, you know, full function technology available for at least five years, I mean that's kind of how their industry's maturing.

But it's possible to start a company and make money today making bikes, motorcycles with lithium ion batteries.

And, you know, we're going the opposite way, we're saying take the best car you can buy and let's make it a plug-in hybrid or an electric vehicle that everything that

it does, so we're starting from -- you know, really doing a top down approach.

It will be very interesting, but I think that it's very clear that it's a worldwide issue, and I don't know that that was necessarily the case in the nineties, when we had what was essentially a California-led EV push. It's not that there weren't vehicles in other countries, I just don't know that anyone chained themselves in front of a yard to stop them from being carted away.

MR. OLSON: Let me, going back to the U.S., your comment about the price of fuel will have no effect, meaning that when you look at the total cost stream, even if the electricity is cheaper than gas or diesel, on an equivalent basis, GGE basis, what would it take in terms of an incentive to kind of equalize that cost where fuel prices would have an effect?

MR. DUVALL: Yeah, a Chevrolet Volt at a long-term price, a car like a Chevrolet Volt, at $32,000 can be life cycle cost competitive with a hybrid vehicle or a conventional vehicle at their likely cost separation.

However, there's not a lot of evidence saying that there is a huge group of people out there that see the world that way. EPRI just got a new member from Brazil and he came to our meeting for the first time and said that Brazilians tend actually to think that way off the bat, that

they'll pay more for a car that they can pay less on a weekly basis, and that's one of the things that makes natural gas popular over there, the cars cost more but you have to pay less per week.

So I guess you trade an up-front irritation with lower weekly irritation.

And so I think one of the issues back there is that in the first five years, when you're dealing primarily with early adopters, is the financial picture really pushing it?

I will say one thing though and that is that everything that EPRI's ever done in this area on cost analysis has been with the implication that people are getting their electricity at retail residential rates from their home charging.

So if you start to -- remember, if you start to add other ownership models, they add cost to that because they have equipment to get a return on, they have investment that they need to earn a return on, they have O&M costs that you simply don't really have at the residence, and it will increase the payback time.

So the charging model or the ownership model of the charger is, I think, very important to this discussion, and I think we need a better understanding of what people are actually going to pay at these multi-user, public access

charging networks.

I mean, I've done some back of the envelopes on fast charging that depend on your assumptions but they could be prohibitive, you know, it could be very expensive, gasoline equivalent pricing, depending on what you pay for the capital and what it costs to operate it. And if you're at 5:00 p.m., summer peak, you could pay some very high prices for electricity.

But once again it points to the idea does someone own an electric vehicle to save money or do they own it as a lifestyle choice, and the answer is probably yes to both of them, depending on the person.

MR. OLSON: And there are examples in natural gas, where this will be for fleet pricing, that contracts for fuel for natural gas vehicles are a big advantages, even with retail prices being a good comparison, the gasoline/diesel fleet pricing, meaning a year-long contract, is a way of even reducing that cost even more.

MR. DUVALL: And we agree completely.

MR. WARD: You mentioned the Volt at 32,000, that takes advantage of the Federal tax credit, is that what you're --

MR. DUVALL: I meant long term, so tax credit's gone away. You know, I think --

MR. WARD: Oh, prices come --

MR. DUVALL: Yeah, I think long term. And this is highly dependent on the price of fuel but there is ample evidence that lifecycle cost, the lifecycle cost potential of plug-in hybrids, or EREVs, or electric vehicles is substantial and there are a lot of cost models that need to be updated. We're generating a lot of new concepts and so we need to update a lot of the existing cost models.

But we typically always show, at EPRI, that -- that, you know, conventional vehicles were -- hybrid vehicles were slightly more up front -- had higher up front costs than conventional vehicles, and plug-in hybrids were a little more, and plug-in hybrids with more range, like the Volt, were a little more and electric vehicles were the most.

But at $3 and up, the steepness of the curves made most of the plug-ins a pretty good deal, net relative to hybrids or conventional vehicles.

And then what was often in question was the electric vehicle, because the battery was significant -- it was a significant expense that had, it was kind of a stiff expense that you had to deal with.

We're hearing a lot of people saying that may not be the case anymore, and while I'm not sure that I believe that, we do have to take a closer look at this. But it will all depend on, you know, what retail costs level out at, and

you won't know that for five years.

MR. WARD: Well, the lifecycle, you mentioned also, what about the battery life of that vehicle and you have to replace it sometime.

MR. DUVALL: I think battery life is going to fade as an issue. They're definitely very concerned about it now, which is why you're seeing relatively conservative approaches by the automakers to the design, and development, and management of battery systems onboard vehicles.

But for example, once again back to the Volt, sorry to make this sound like a GM commercial, but I am a part owner, as are all of us --

(Laughter.)

MR. WARD: You're here.

MR. DUVALL: Is that, you know, I think you could reasonably expect a Volt to last 4,000 cycles. I mean, based on what I know from publicly available testing that EPRI, and SC, and other utilities have done, 40 miles, 160,000 miles, and they have more improvements to make. The industry's been very good at improving the durability of their product.

Price, and energy density, and things like that, we still don't have the really cheap, 300-mile EV, but we have very durable battery systems and I think there's every evidence that they're getting more durable.

And so while I think it will always be a concern, I expect that one to lessen in priority.

MR. WARD: I'm anticipating, from what the last go-round with batteries was, that was one of the bit sticking points of the debate, if you will, the life of the battery.

MR. DUVALL: Yeah, and I think it was very surprising when the accelerated test vehicles of Southern California Edison reached 100,000 miles and the batteries still worked. So I mean that was, I think at the end -- at the end of -- when we got done with electric vehicles, batteries were still expensive, we didn't have a 300-mile EV, but we had a hundred thousand mile EV, and that was something that no one really thought they could get.

In general, our perception of battery life about doubles every five or so years. And when I mean perception, it takes you three or four years to test a battery to that, to the types of life you're getting today.

And so the technology has been moving pretty rapidly toward greater durability and now we're starting to hear people say, wow, we think we can do 7,000 cycles.

So it's unproven at this point and a lot of data is cell level and not pack level, but I think that this is one place where the industry has overachieved relative to expectations, and if they continue to do so then this will

go -- this will go away and we'll be talking about secondary uses more.

MR. WARD: And the range may not be as big as big an issue as we once thought.

MR. DUVALL: I think cost will be the limiter on range. At the end of the day, as batteries go down in cost, I think auto companies will attempt to make money and so that means let's make a less expensive car and sell it to more people, and make money on it.

MR. OLSON: Mark, in your studies that you mentioned, EPRI studies, can you make those available for our docket, are those clients going to -- I can point you to them, they're all public. Everything I've pointed to you is publicly available at this point, but I'll make a note of that.

MR. OLSON: Thank you.

MS. BAROODY: Okay. Well, thank you very much, Mark, appreciate it.

Next up, from PG&E, Saul Zambrano.

MR. ZAMBRANO: Good afternoon. I see we're rolling a little late so I'll try to -- I'll try to make up some of it so we can get some people on the road back to Sacramento.

First of all, thank you to the CEC and the CPUC for this opportunity to present. We think this topic is

incredibly timely and it needs the full brunt of all of our collective efforts to address this transition, which we are looking -- we are eagerly looking forward to.

Some of these slides I'm just going to shoot through. There's a couple key message and some others that really deserve some extended time.

But one of the things is like how are we setting the table, what is the framework that we're looking at relative to the adoption of these vehicles for California?

And, you know, from everything we've heard relative to our talks to automobile manufacturers, 2010 is really the initial focus of mass marketing for a new generation of electric vehicles.

I think everyone has seen that, it's relative to a lot of the industry events that go around, that center around this topic. But what is clear -- there is a bit of ambiguity as to how many of these vehicles, when will they come to market, but what is pretty clear is that they provide significant environmental and economic benefits.

And it's -- and like everything in life, you got to manage the runway. And from our perspective, we think the runway is getting short relative to the launch of these vehicles.

And, you know, unlike one pilot per the plane, this is a really interesting dynamic because you actually

have four or five pilots in the cockpit trying to coordinate messages and communicate effectively to get this plane off the ground.

Right and, you know, when we look at who is critical to making this successful in the marketplace, we see the CPUC, the CEC, the utilities, the utility companies, the automobile manufacturers, the technology vendors, you know, and the stakeholders that go along with that crowd.

And what we decided, we said, you know, how are we going to manage the introduction of these vehicles as a utility and who is -- where is the most critical discussion that we need to have.

Well, clearly, from a regulatory perspective it's the CEC and the CPUC.

But it's also we are in deep discussions with the automobile OEMs relative to what are their expectations of the market. You know, what type of vehicles are they bringing to the market, you know, what time are they bringing these vehicles to the market and in what volume.

And then the next two slides, it's kind of a summary of our discussions. And the way to read this slide, there's two key messages here. You know, one of my favorite sayings is that every technology has its window and we truly believe that this is the window for electric vehicles, and the two principal drivers behind that is the return of $3.00

a gallon gasoline. I'm sure everyone's filled their gas up within the last week or two, and we know what that is, it's around 3.20 a gallon right now.

And from our perspective it's, you know, you got to say will the supply and demand imbalances either get better and make gas more affordable or will they actually get worse and make gas, you know, less affordable.

And so from our perspective we look at what's happening in the global landscape because that's the right way to look at the petroleum industry

And you ask yourself, you know, Brazil is growing, Russian's growing, India is growing, China's growing, so the relative supply -- the relative demand is growing at a very healthy pace.

And then you got to ask yourself, well, what's the supply window look like? And we keep coming back to the reality that it's more expensive to pursue petroleum reserves. This is like in its -- you have to do it in politically stable areas, so there's a cost associated with that.

So, you know, from our perspective you have to take a -- you have to decide whether you believe peak oil is real or not, but from our perspective we actually, we truly believe it.

And I think the other key component of this slide

is that when you looked at what's happened in the past versus what's happening in the present day, over 70 percent of automakers are introducing plug-in vehicles. This is by market share, right.

And they're doing it with a variety of form factors, so they're targeting different types of consumer niches, right, or not consumer niches, but the different types of cars that consumers want, whether they're performance, family sedans, compacts, SUVs, and minivans, just to name a view.

And one of our observations around this is that it's different, a lot of automobile manufacturers coming to this space, they're bringing product, they're bringing product to address different consumer classes. What's very interesting is they're all targeting different attribution -- not attribution models, but different ways to harness telematics to differentiate their product. So it's like they're looking at these from a network perspective to actually be informative to the consumer relative to their entertainment consoles.

And each one of them has somewhat of a different play, but what we'll be clear is that a majority of these vehicles will be networked. They will be networked in a variety of different ways and they will differentiate themselves relative to the products that they offer their

customers, like to the type of services that they provide.

And I think the other key thing is that there were a couple of statements that were made earlier and the -- you know, one of the things that we're not seeing in North America at this particular time, there has been no publicly announced partnerships relative to battery swapping architectures.

So we're viewing that space pretty optimistically, we think it will happen, but we're still waiting to see whether those announcements come to fruition.

But the only reason I mention this is because this is not a knock against a particular business model, but I think relative to that type of architecture there's going to be grid impacts.

Right, so it's like whether it's a level III charging at high voltage, high load, there are going to be great impacts that need to be managed by the utilities. And it's whether it's a battery swapping station, we don't know what the grid impacts are because it will be highly dependent on what their inventory model is.

And so if they got three or four batteries that they've got to continuously be charging at a very high pace throughout the day, there will be great impacts.

And if they got an inventory stocking model of a hundred batteries, they could probably defer all that

charging to off-peak. All right, but that's one of the key areas that we're looking at, we're looking at pretty optimistically, but we know it's an area that we, as a utility, have to address proactively like in a very constructive manner so we know what that means to the overall grid.

Now, I think one of the questions that was asked earlier of Mark is how do you look at the demand for these vehicles?

And I know the chart is busy but if, you know, to channel Mark, if there's anyone who tells you what the volume projections for these vehicles are and they tell you with 95 percent certainty this is what's going to actually come to market, well then you're probably at a carnival.

No one knows. Right, no one knows. But there are ways to be intelligent about what you think the volume forecasts are and what we did was we said let's look at some of the studies that were commissioned by various -- various, you know, commissions -- not commissions, but various government entities within California and say, okay, how does that compare to the HEV historical adoption rate ten years pushed forward.

And I'm from the technology sector and what we've know is that if there's a technology, and it's a related technology, you know, but significantly different, the

diffusion curve tends to be a factor of 2X or 3X.

So when we looked at the HEV historical, and this is that black line right down there, second from the bottom, we said the past ten years relative to the next ten years, you know, how does that compare to some of the projections?

And as you can tell it's actually -- you know, the projections are material, right, it's like a lot of the work that's been done so far is actually a good gauge of what we're going to see relative to these vehicles, if everything that comes to pass the way that we think it is, you know, for the PG&E service territory, so this is the projection for PG&E service territory.

So the Tiex average of 300,000, you know, plug-in electric vehicles by 2018, and PG&E, could come to pass if everything aligns in a perfect world.

And what are the drivers? And when we look at this we say the drivers are, are Californians going to buy more than their fair share, which we have done for the HEV market. We've bought 24 percent of the EVs in North America, meanwhile our population is only 12 percent and so which is a demonstration of our commitment to values and to leadership.

And then it's what type of increase federal/state incentive mechanisms are going to be put on the table for these vehicles and what are the charging consumer behavioral

norms?

This goes back to Mark's statement relative to commodity instatement.

Like my perspective is that there's going to be two types of individuals for these cars, the people who want to make a statement relative to their values and then the people who do the back-of-the-envelope business case analysis to figure out is this good for me or not.

I happen to be the back-of-the-envelope -- I care about the environment, but it's got to pencil out for me; right, and it's like that's where we think the price of gas will make a difference. For the people who are looking for an economic equation that works for them either on a mathematical basis or is complementary to them relative to their value set.

And then the biggest game changer that we look at relative to these plausible game changers, it's the battery technology advancement. And what is interesting about this space is that there has been a ton of money invested in battery technology companies and the cost curves are coming down faster than anyone thought a year ago or two years ago, which fundamentally makes the economic equation much better for consumers as they purchase these vehicles.

Now, what are the opportunities and challenges for a utility for this, right? Now, there is going to be

increased loads due to PEV charging, which is yet to be quantified on the distribution system because we just don't know where they're going to go; right.

But based on where people have purchased HEVs, we expect them to be highly clustered, right. So this goes back to the overall it matters relative to the secondary -- the secondary distribution system for the utilities. And it's like it's critical from our perspective to do load management.

You know, at the end of the day if you don't manage these vehicles and they cluster, it's like you will have transformers that blow, right, and relative to the utility charger of safety and reliability, that's unacceptable on our part.

So from our perspective, we're actively looking at how do we mitigate the adverse impacts to the distribution system?

So we're very fortunate in California in that California has already made their investments relative to the advance meter initiative, which is a -- it's a Smart Meter architecture.

So there is being -- we are currently deploying, as well as our other utility partners in the State of California, an advanced, you know, a Smart Meter architecture that effectively lays out the -- that creates a

bi-directional data communication plane, which we are looking at how do we manage Smart Charging relative to that architecture.

So it's like we call it the HAN platform, which is home area network, which is jargon, but it's basically how do we know what EVs are charging via, you know, EVSE charging stations and how do we support them relative to dynamic billing, it's load management opportunities, and standardization of utilizing our existing infrastructure.

And why do we right, that's the important question, why do we want to do that?

Well, one of the key, one of the key things we're looking at that if you don't do proper load management, you're going to get the spiky effect. It's people are going to come home, TOU rates are going to be put in place, they start at ten o'clock, everyone sets their timer to ten o'clock and all of the sudden you've got an artificial peak and you've got transformers popping, right.

Now, the question is, is like what does the charging profile of these vehicles look like and I'll touch on the charging profile with the balance of the slide, but I also want to go back to some of the standards work that's being done.

There's really four types of charging profiles that are in development today, the AC level one and the AC

level two, that is the 1772 charging profile that is being developed by SAE and its various partners. And, you know, that's effectively a 12 amp to 60 amp, as much as an 80-amp circuit.

Now, what does that mean? Well, that means that the charging profile is 1.4, 3.3, or 6.6 kilowatts.

Now, when we look at that lower left -- the lower chart on the bottom right-hand corner, how do those charging profiles compare to the average peak load for across the PG&E service territory. And as you can see, it's the 1.4, the 3.3 and the 6.6, that is the equivalency of a house, or half a house, of a quarter of a house.

So when we looked at this it's -- and this is all with the fundamental belief that these cars are going to cluster and we actually have analysis that supports that, that we're effectively going to have to -- in order to maintain the reliability and the safety associated with the utility charter, we're actually going to have to dynamically manage that, right. It's not going to be enough for us to just, you know, let these cars come on the grid and not mitigate the impacts that they could -- that they could pose to the grid.

Now, if I go to the lower left-hand corner, you now, what do we think will be the predominant charging profile?

And what we did on this lower left-hand corner, we said what is the charging time associated with these different charging profiles?

And we keep coming back to the conclusion that most customers are not going to be happy with the seven-hour charge time, right, and that's that 120-volt type charging profile, and it's like they're going to want 240-volt, whether it's 16-amp or 30-amp, to get that charging profile down to three hours and two hours.

You know, so that effectively means that that 3.3 and that 6.6 charging profile we think is going to be the norm, not the exception. And that will represent either an incremental new house load or a whole house load.

So this chart I'm not going to spend a lot of time on. It's, you know, basically, we've been involved in this space for quite some time, not only on the electric vehicle side, but on the natural gas side as well.

We've partnered with CEC on many projects, we view them as a strong partner.

This is like to getting to the right answer, I'll let people read this on their own, but it's really just an example of a CARB-funded infrastructure program that we've done, how we funded it, what type of equipment providers we brought to the table and what we've accomplished.

The key takeaway though is that we made provisions

for future cord set and coupler upgrades to new SAE J1772 standards.

I think what is critical here, is Mark hinted on this earlier, there are a lot of people who are coming to market, who are basically saying I have a solution, right, but a solution without a clear -- a clear alignment path, with a standards-driven architecture, so we don't get into this inductive versus conductive problem that we face in the first go around is critical because otherwise there is a strong risk of stranded infrastructure. All right, and it is clear that needs to be a goal set for any program relative to the alignment of a standards-driven deployment.

This is just pictures of what we did relative to our partners and some of the installation.

But the key lessons learned here was that SAE-compliant equipment, this is -- there's two principal standards that are being driven by the organization. The actual physical connectivity is 1772, that is effectively balloted so that should be done relatively soon, and relatively soon like in a month.

The EVSE communications from the charger to the utility is a standard that's being drive by SAE, it's called 2847, we consider that a key standard so that we can enforce that bi-directional communication.

The architecture needs to be upgradeable, right,

so it's not enough that you deploy a solution that is stranded, it's like there has to be a clear line of upgradeability relative to future enhancements for the infrastructure.

It's engaged stakeholders early, there's a lot of stakeholders. And I think Richard and Coloumb really highlighted this point well in this morning's session, is educate local planning and permitting agencies.

When we keep looking at what does it take to install one of these chargers, it's we keep coming back to this is one of the principal choke points. It's every municipality has its own approach relative to installation, permitting, and so forth, right.

We strongly believe that there has to be some harmonization in order to get this -- in order for this to be cost effective.

The posting of charge rates on equipment, it's -- I think that's self-explanatory but, you know, it's about setting customer expectations.

ABA issues still need to be fully addressed. I think people have scratched the iceberg but have not completely gotten to the bottom of all those issues.

The network effect, we think it's critical relative to these solutions that it's not only that the chargers, but people are made aware of the chargers using

utility -- not utility portals but basically, you know, consumer portals. Like where are these chargers, are they working, are they available?

And you can do that either through kind of what, and I always use this short term, WEB 20 architectures, but basically can you do it through your internet, whether it's your phone or your laptop.

And then siting agreements for new installations take time.

So with that being said, you know, as a utility we support the acceleration and standardization of vehicle charging infrastructure. It's got to be open, plug and play, national, convenient for consumers. I think there needs to be, as there was in natural gas, incentive to authorize needed investments in charging infrastructures, the expedited approval of new utility time variant tariffs and other load management measures, and streamline building permit and retrofit regulations, and then establish as policies safety and reliability standards, you know, that take it -- that is part of the utility mandate.

I think that's it. And I think the key thing is that we have an obligation to our customers, both EV and non-EV. We have an obligation to provide a level playing field for all auto OEMs and so we have to provide a solution that addresses the entire auto OEM community.

And it's -- and we need to do it so we don't stifle demand at the consumer level and that we actually foster innovation at the technology level, with people who want to participate I this area. Okay.

MS. BARODY: Thank you, Mr. Zambrano. Do you have any questions?

(Applause.)

MR. OLSON: Yeah, Saul, this is Tim Olson, I have a question about -- can you describe, does PG&E currently have any special program for renewable energy sources for transportation, for electric vehicle?

So if a customer wanted to have an entire renewable energy mix as a source of power through a contract or a program, could they get that? Is that anticipated?

MR. ZAMBRANO: Yes, they can. Actually, we still have two rates in effect, E9A and E9B, that effectively allows anybody who has an electric vehicle to have an EV-specific rate, and so they just have to call our operations center, or our call center, and we can service that request.

MR. OLSON: And do you have any comments about, we've had discussion here about having separate meters, this question about how to streamline or standardize the permit process?

One comment was don't have separate meters; any viewpoint from your company on that?

MR. ZAMBRANO: Yeah, we've actually been looking at this quite a bit and there's really -- there's three types of metering arrangements that you can look at.

One is a parallel meters, so you basically have two meters on the side of your house and you route the 240 circuit to your garage.

The other one is subtractive metering, which effectively subtracts out the EV usage from your entire house.

And then the other one is to craft an EV-specific tariff that addresses your normal daytime usage, and then your EV message at night. And what's interesting about those three different approaches, they all have level -- different levels of costs associated with them, and the cost is in different places.

If you look at the subtractive metering, the cost is primarily in the IT integration relative to the billing architectures of utilities. It's actually a very problematic programming challenge.

If you look at the parallel meter it's -- you have a lot of site visits, the provisioning's more expensive, and you have the added cost of the second meter as well as the EVSE.

If you look at how do you look at the whole house rate, that structure for EV owners, you can actually do it

in a very clever way so that it minimizes the number of visits relative to installation, and it's -- and it addresses both the needs of the consumer relative to off-peak charging.

MR. OLSON: Thank you.

MS. BAROODY: Okay, thanks a lot, Saul.

Okay, next we have, from Southern California Edison Company, Mr. Doug Kim.

MR. KIM: Thank you. Good afternoon and thank you for this opportunity to be on the panel today.

I'm pretty exciting to talk about some of the work that we are doing as a company on this PEV.

My name is Doug Kim, I am the Director of a relatively newly formed PEV readiness program for Southern California Edison. It's a multi-functional, it's an across-the-company effort to basically, with the objective of getting the company ready when the cars start rolling out, probably in about a year.

One of the benefits of going kind of late in the day is there's almost everything you want to talk about, somebody has already covered that to some form or the other, especially after EPRI and PG&E, I think.

I could probably do this in two minutes, but I will talk about a few additional things. Now, we're pretty excited about this as a company. We've been in this space

for quite some time. For over two decades now we've been continuously operating electric vehicle program.

We have the largest private fleet, electric fleet in the country, with over 17 million electric miles to date. We have extensively and collaboratively worked with many stakeholders, automakers, battery suppliers, and other folks in this space and, obviously, some of the folks have noticed our effort, we had a very nice visit with the President, I guess in March of this year.

Now, as we look ahead there are challenges and we are working seriously on how to address those challenges. The fact of the matter is that of the annual cars that are sold in the United States, about 12 percent I think is bought in California.

But when you look at the hybrid electric cars over the last ten years, eight years or so as a proxy, I think about 24 percent of that is purchased in California and about a half of that is in the Los Angeles County. So we know that in about a year there will be a number of these cars showing up in our service territory.

So the question then is how do we get ourselves ready between now and say in about a year, just addressing some of the customers' needs.

So rather than spending a lot of time talking about the analytics and the data that most of the folks have

already talked about, what I want to really focus about for the next five minutes or so is just what are we doing specifically to address those near-term needs.

You know, as a utility, we always look at, before we make a long-term investment decision, and we look at ten years or more down the road. And it just doesn't work very well in this case, right, we've all talked about, gee, you know, what is the market adoption rate in 2020? Well, we don't know, it gets pretty hazy.

We looked at a number of different data points. Somebody mentioned the supply side, based on what automakers say they will make, we looked at the -- we looked at the capital market analysts, what they think the market will do. We looked at independent consultants, other research institutions and the government agencies, and the fact of the matter is the numbers are hugely variable.

` So basically we're operating under three principles which is let's not presuppose we know exactly what the market is going to look like in 2020, let's look at the market development in terms of phases, right.

So the three principles we're using is, one, let's figure out how we are going to address 2010 and 2011 market between now and sometime the middle of next year, right, there are a number of things we're going to do and we're going to talk about that a little bit later.

The second thing is how do we maximize the customer choice? Because in our view one of the things that's going to matter critically in the adoption rate of this plug-in electric vehicle is the customer satisfaction, the easiness that they can navigate through all this installation process, and the different grid options. So we're really focusing on the second principle.

And the third option is, the third principle is as we go through this OIR process this year and going onto next year, there's going to be a lot of discussions about the policies and things like that, and we've responded to a number of those things in the 42 questions that we got.

Our basic mode of operation in there is let's make the right decisions at the right time and let's not make all the decisions or try to make a lot of decisions today.

So this is the organization that we have within Southern California Edison, it's roughly five -- there are five pieces. There's the regulatory, the whole management around the stuff that's going on in OIR and other regulatory policies, there's a team that's focusing on that.

There's a business case development team. Someone mentioned earlier, well, what are the numbers, what are the cost impacts for taking other different types of options, so we're evaluating a lot of different scenarios and also looking at what does that cost, what are the benefits for

making those choices, so we are continuing to work on that as well.

A third piece, which I think is really important it addresses to the near market, which is the customer -- an operational plan that addresses customer process. So we have a team that basically looks at all the process from end to end, right, not just what happens when somebody calls up the phone center? But it's really a more holistic approach, from the initial moment the customer engages us to actually they can start driving their car, we're looking at the whole process, so that's that team's effort.

Customer communication and marketing strategy, we think that's a critical piece. The fact of the matter is this market doesn't really even exist today, it's beginning.

A lot of folks who's going to be purchasing these cars will not be very familiar with lots of different details about how to go about getting the stuff installed, and what type of rates that they should be on, and so forth.

So we are developing right now a plan to address some of that.

And the last piece is our infrastructure upgrade plan. You know, many folks have addressed the need to look at sort of very localized distribution level, see what happens when folks buy, say, a car that charges at level II, which goes up to 19 point per kilowatt, that's somebody

mentioned it’s like adding a house. Yeah, what happens if there’s two or three of them in the neighborhood, which is entirely possible in the places like, say, Santa Monica, so we’re looking at that as well.

So it’s really all of these different pieces that make up the effort for this team.

So guiding principles, a lot of discussions but, from our view, the number one thing that we can do is support our customers, right. We talked about processes, we’ve seen this year, through a Mini E experience, it could take weeks sometimes to get through this process.

Because for one, even if we get all our process highly optimized, there are a lot of folks involved in this thing; there are the cities, all right, that you have to get permits, you have to get inspections, so by the time you add all of that process up, you know, it can add up to weeks.

So we’re looking to figure out how to minimize that.

Customer choice, obviously, you know, there are different rate options that are available right now. You know, customers could choose to stay on their current tiered rate, or they could choose to go on a whole house TOU rate, which has a PE component to it -- PEV component to it.

Or they can go onto a dedicated, which requires a separate meter to measure their usages.

So we have all those different options available to day and basically our position is while we like folks to, you know, perhaps choose the options that will save some of the process times, right, because if you put dual meter you're putting additional time.

Somebody mentioned that earlier, we've seen that happen this year as well, when you put a dual meter it just adds more complexity. But we will make all those choices available to all the folks who choose that rate.

Customer education, this is an important piece. Really, there's two pieces here. Not only outreach and educating the customer but in our view one way that you can really reduce the process time is while people are actually thinking about buying a car, right, don't buy a car and then bring it home, and then figure out how to get I charged

While you're thinking about buying a car, we'd like to be able to somehow reach out to those customers have them raise their hands and work with them concurrently so that we can reduce substantial amount of this cycle time.

So that's a plan that we're currently developing and hopefully, within the next few months, I think we'll be able to start, you know, implementing some of these campaigns, and we certainly hope to do that before the cars start coming out next year.

Getting the infrastructure ready, all of the

complications, implications, people have talked about that already.

We are currently building and running some simulation models about different effects, you know, in the local circuits. And as we get through a little farther we'll have a deeper understanding of physical impact and therefore potentially cost impact. And so that's a work that's ongoing, but it's clearly an important issue for the utilities because level I, level II, and level III charging just has a tremendous, especially if you go up to level II and three, a tremendous impact to the utility.

Okay, this is the OIR process that's ongoing and we certainly are prepared to fully engage and support the Commission in developing fair and workable policies.

Three principles, basically compliance with the existing policies because after all, you know, we have to make sure that our total electric system, reliability's not jeopardized through this process and that there are reasonable and appropriate rates for customers that purchase electric vehicle.

And we also want to optimize system use, right, and we definitely encourage folks through rates and other incentives to charge during the off-peak hours because that will really help us.

Encourage and support all the adoption. Again,

this is all about addressing customer needs, our strong focus that we have today.

And adopting codes and standards, this is critical, right, because there are lot of possibilities of these electric vehicles. You know, I hear talks about vehicle to grid, which is a definitely possibility down the road, I hear a lot about, you know, load control or other types of programs. All of that is depending on these vehicles and EVSEs to be compatible with our Smart Grid, so we strongly encourage the Commission to ensure that the whole State adopts those standards.

The interim focus, again, we talked about focusing the right issues at the right time. The fact that there are 42 questions in the OIR, I think that's a good indicator of how complex these issues are.

And from our view, you know, we have 14 million people in 50,000 square miles, there's not going to be one single solution that fits all of these needs, it's going to be some type of a hybrid solution. And we are very open to engaging the OIR process, and the Commission, and other stakeholders to come to the right conclusion.

So that's what we're looking forward to in the near term.

In terms of AB 188, a specific recommendation, I think somebody mentioned earlier this morning, in our

service territory there are 1,800 charge points that could probably be refurbished with a relatively minor investment, so I would strongly encourage that we take a look at that possibility for Southern California.

And after that, again, then we'll have to engage in the process to figure out what happens in the next phase with the build-out plan.

So that summarizes what we as a company, we're doing right now.

MS. BAROODY: Thank you, Mr. Kim.

(Applause.)

MS. BAROODY: Questions?

MR. OLSON: So, Doug, in response to your focus on now approach, the Energy Commission, in our April 2009 Investment Plan estimated a need for upgrading existing, all existing charge points in the State and to set aside money for some new.

We heard here today that maybe the planning should be one and a half to two charging stations per vehicle.

And from our interviews with automakers, we're estimating of anywhere in 2010, if you add it up, close to 5,500 vehicles that might be on the road, part of that rollout.

So in essence we're thinking we're setting aside enough money. We have already funded some of the eTec

projects that will be installed, and then we're setting aside money, we think, to cover this kind of near term.

So I guess the question is what more -- in essence, this workshop is about kind of planning for July 2010 on. How many more stations, these charging points should we plan for and how far in advance? So is this year by year or do we need to plan two or three years from now in terms of allocating money and spending money on that infrastructure; any insights on that or comments?

MR. KIM: Yeah, that's obviously a tough question because that presupposes that you know the adoption rate over the years and where they're going to happen, right, it's just not -- it's not sufficient that you know how many cars because you kind of need to know where they're going to show up, right, because then you can focus on those areas.

What we are doing as a company, we're looking at 2010 and 2011 as a planning period. So the plan that we're doing is not year by year, per se, but it's initially the first couple years, and then the next cycle of planning, which will be next year, will cover 2012 through 2014, so that will be the next three-year cycle.

So our hope is that as we get a little smarter about how the market is developing in the 2010 and certainly all or part of 2011, we'll be able to make a lot more intelligent choices about where to focus on in terms of,

say, grid infrastructure upgrade, in what areas. So that's kind of where we are heading.

Our view is, and this is just a near term, 2010 and 2011, when you consider the number of cars and the likely adoption areas, I think it will be highly localized and it will be mostly home charging.

So we feel that if we can combine that with, say, some of the existing charging infrastructure, that may be a reasonable to get us kind of through the hard spots.

MR. OLSON: So in our plan what should we -- is there an estimated time frame that we should consider as the installation time to be ahead of the rollout?

MR. KIM: Certainly, the 2010, the fourth quarter, we think will be a relatively small number of cars. And 2011, certainly we can, I think in our service area, expect to see fairly significant cars, so that perhaps that's the one to --

MR. OLSON: Okay, thanks a lot.

MR. WARD: Doug, I have a question, too.

MR. KIM: Yes.

MR. WARD: You probably are no doubt in touch with all of the vehicle manufacturers and getting an early warning on when those cars and when they'll eventually be rolled out. And I know that you can't know where they will all go, but I know that the automakers do have hand-raisers

show up in particular areas and regions for other fuels, and this one probably as well.

MR. KIM: Yeah.

MR. WARD: Are you getting any early intelligence for regions, zones, areas within your service territory?

MR. KIM: Yeah, there's a couple ways. Three ways of really we're kind of going about doing this. One is yes, definitely, you know, as you know, we talk very collaboratively with the automakers and some folks do have perspective.

But second data point though is that when we look at the early adoption of, let's say, the hybrid cars, back in the early 2000 through 2002 or '03, it gives us a pretty good proxy for the kind of neighborhoods they would expect to see, they would expect to see these cars show up.

And the third part is obviously just directly engaging customers. Remember that I talked about customer outreach program. One thing we'd like to get out of that program is not only simply telling customers and educating them as what they need to do, but please tell us, right, whether you're interested in buying cars, so that we'll have advanced intelligence as to where to focus. So we're really using all three.

But we have some idea right now of where the areas are.

MR. WARD: Thank you. Your customers probably have a better insight as to where that market would be, rather than the automakers, they may be responding to their customers, too.

MR. KIM: Right, right.

MR. WARD: So staying in touch with your customers is probably a good thing.

MR. KIM: We really here are trying to get as much information from the customers.

MR. WARD: All right, thanks very much.

MS. BAROODY: Thank you very much.

Well, we're getting toward the end here, we have two more speakers. And the next is San Diego Gas and Electric Company, Jeffrey Reed.

MR. REED: So let me be, I think, the second to the last to thank the CEC for convening the workshop and the CPUC for hosting it.

So I'll be pretty brief here, give a few perspectives regarding the AB 118 program.

And let me just start by saying that like the PIER companies, SDG&E has already started on the PEV readiness road.

We're fortunate to be one of the host locations for the eTec study that you heard about. In addition, we've been awarded a Smart Grid demonstration project in the

region of a small scale, and have applied for another, much larger program under the stimulus program, and we think that in the San Diego region those two things, together, will put us pretty well along the road to PEV readiness and should hopefully provide a knowledge base that a lot of people throughout the State can use.

So let me begin by just giving a little context. And I think, you know, this has been said by most of the participants here in various different ways. I think that the first point is that the goals of what we're trying to do are fairly straight forward. Obviously, they've taken a pretty long time to develop.

But the first goal would be to advance PEV technology in support of low-carbon fuel standard goals as an overarching goal, and then to ensure that the infrastructure is ready such that lack of infrastructure doesn't constrain the market, but at the same time being cautious about stranded investment.

Maximizing consumer convenience, while encouraging behaviors that are consistent with broader energy policies and effective and efficient use of the grid.

And then listed last, but first priority of the utilities, of course, is to protect the safety and reliability of the electric system as our primary goal.

So while these goals are straight forward, the

planning environment is not so straight forward, and I think that's been woven throughout all the discussions today.

A couple of underpinnings for this, the first is that the automotive industry, and the electric power industry, and their suppliers will move on their own paths, so there's a lot of communication, I think everybody's in contact and discussion with OEMs, but the drivers are slightly different across the two industries, so that's one point of uncertainty in the planning.

Next, consumer adoption and consumer behavior are uncertain. Any time we're in this pre-adoption stage of a market, you know, there's a lot of prediction that goes on, but no certainty.

Lastly, the underlying technologies in the PEV and the EV space are emerging and as well as that of competing technology. So when you look at PEV adoption and you look at, you know, bio-fuels that are being developed, liquid fuels, natural gas and others, so that adds to the already significant uncertainty of adoption for electric vehicles.

So I think we'd suggest a few principles, one would be to focus first on no-regrets priorities, meaning those things that we have to do anyways, so don't place big bets on major infrastructure build out and things like that, but focus on things like Smart Charging, Smart Grid integration, consumer behavior, and those types of things

that under whatever PEV scenarios may unfold those things are going to be needed and useful.

The next is focus on getting real consumer data wherever it can be found, and currently we can get that perhaps from earlier stages of the market.

The period of the mid-nineties has been mentioned quite a lot, but also places like Tokyo have been mentioned, analogous adoptions, and things like that.

But as well prepare very carefully now for the wave that we've been talking about, beginning in 2010 and the next few years, to be ready to carefully track and gather data in the first wave of market adoption, to begin to build the fact base that Mark was talking about.

Obviously, we need to be scenario based, so we need to be planning in terms of not one set of outcomes, but in light of the significant range of uncertainties across the different areas of market development here, and in that context I think we should look at pilots and experiments of various types as stranded investment. Obviously, we don't want to throw money away, but if we put out, say, 50 charge points, level III to see what consumers will -- how consumers will behave based on those, and how that impacts range anxiety, and things like that.

Even if some retrofit is required, it's probably money well spent as long as we carefully design those

experiments and don't foolishly create obsolescence where we can avoid it.

So just as some illustration, you know, one point of uncertainty is what's the head-to-head cost difference between the different low emission vehicle options that people have.

This is an Energy Information Administration curve showing the relative cost of different fuels. This particular curb is not adjusted for vehicle fuel efficiency or equivalent miles per gallon.

But you can see, you know, according to this project many fuels are kind of in a bunch there. Electricity, if adjusted for efficiency, mile per gallon equivalent of course would show, according to this projection to be a cheaper alternative, so I think the PEV adoption will be driven by that.

You also see natural gas has a fuel-to-fuel advantage relative to others.

Another kind of unknown not shown on this curve would be bio-petroleum type things that are forecast by some people to come into the market within ten years, and hit maybe.

So that would be also sort of a wildcard. So again, that just means that I think we need to plan for a significant, but uncertain level of PEV adoption beginning

in the 2010 time frame.

In addition to the, you know, fuel-to-fuel or technology-to-technology, there are a lot of different model options being developed, so I think the idea is let those things evolve and be ready to learn from them in the early stages of the market development.

In terms of utility role, I think this is fairly basic, it's been said by a lot of people, but the utility role predominantly would be to provide the necessary infrastructure to support market growth, to participate in the development, and the tools, and knowledge base on systems impacts and integration with the Smart Grid.

And also critical is the development of rates and programs to support policy goals, consumer education and outreach. And utilities, of course, are a natural partner in many of the pilots and demonstrations in this field.

So in terms of recommendations specific to 118, one would be place priority on modeling of some of these impacts, the modeling of clusters, electric system impacts, and these things, those will be needed regardless of the macro market formation,.

Because I think, as everybody said, clusters will certainly occur.

Smart Charging, interaction with Smart Grid and potential role of PEVs as distributed energy resources would

be another area of focus.

Behavioral studies and pilots, I'm thinking any analysis that's discussed, the uncertainty and the dependency on how consumers will behave is mentioned as very critical.

Things like the impact of public charging availability on range anxiety and impact of rates. You know, sometimes we kind of speculate how price sensitive will customers be, will marginal pricing alone be enough to keep people incented to charge off-peak.

Those types of questions are amenable to do at least partial answering through studies.

It's been mentioned a few times, possibly use some of this funding to complete the build out of some fast charging corridors without making any projections of how important fast charging or away-from-home charging would be, certainly allowing people to have the capability to travel between metropolitan areas with some certainty of being able to charge would be prudent.

And then development of market development scenarios, so funding studies to help build the proper scenarios upon which we can plan and help identify the critical planning uncertainties that have the highest impact and help us plan around those.

Thank you.

MS. BAROODY: Thank you.

(Applause.)

MS. BAROODY: Any questions?

MR. OLSON: Yeah. Jeff, we have a couple of questions now. I haven't read your comments. I'm kind of wondering how -- your comments touched on it, how (inaudible) -- to install in that area, the San Diego area, do you envision a role (inaudible) -- do you see yourself as a facilitator (inaudible) --

MR. REED: (Inaudible.)

MR. OLSON: Okay, thanks.

MS. BAROODY: Thanks a lot, Jeffrey.

(Applause.)

Great. Bill Boyce are you ready to go?

MR. BOYCE: Thank you. Let's go ahead and get this show on the road. So leadership, SMUD's been actively doing electric vehicle charging infrastructure for 18, 19 years. So given our long history with this, it goes all the way from just being just a local infrastructure provider on regards to this type of R&D work, all the way to being across the whole State of California and Arizona. We're still active in the infrastructure, upgrading and taking care of the infrastructure in our area, the numbers are all there. We still work very closely with the electric vehicle community in our area, so we strive to meet the customer

needs and help the community as much as we can.

This data is in response to one of the questions you asked, it's the circa 2002 data, when we were at the height of our infrastructure installation. It really does give you a break down of the different installation charges. You can see what the effective hardware cost was, what the conductive charger, the conductive chargers at the time were about a thousand dollars less on any given average.

Primarily, you see a cost difference of about 50/50, half of it being on residential, half of it being the installation price.

Level two, at the commercial installation, you see the difference there being higher, that's typically because you had to install a larger electric backbone and that was with regards to something on average about a three to four type EBSC installation for moderate coverage.

I think this was talked about, we did see that most of the charging was home-based. I think people are referencing the recent Pike data, 80 percent home-based.

Significant workplace charging, what we see in Sacramento, really, is what's called public charging in a lot of the downtown parking garages. Even though it's in a public garage, it's actually workplace for the State employees to work next to a building. The number one location, I think quite a few people in this room know about

Callie's PA parking garage at 10th and I.

But Tim, for one of your questions earlier, two chargers per, you know, car, when you take a look at 80 percent of the charging is at home, I get to very much like 1.2 chargers per car considering that 80 percent of the charging's at home. On average I would say that another 15 percent is at the workplace and just, anecdotally, about another five percent actual public.

What you do run into though, you run into a lot of cities, and municipalities, and other groups that are wanting to lead, they want a full environmental stewardship and the desire to have public infrastructure out there is very high and that's why a significant amount of buzz keeps grappling with that issue.

The whole business model, I've had this in other presentations, really worked for a business case. We really did not have enough business volume, that a lot of money was -- I won't say a lot of money, but most of the money was made on the hardware sale, so you see a lot of companies that want to promote hardware. I think you see that still right now.

Installation activities, most of the contractors broke even, but maintenance and repairs lost money. Richard Lowenthal alluded to this today, our data from that period showed the average service call was $255 each and many times

you showed up and somebody had either tripped a breaker or didn't know how to plug in the car right or had to reset the charger. But still, $255 was out. Energy sales to recover that was on the order of 14 years.

So there certainly needs to be a new business case and very hard to overcome that with regards to what we had in the past.

The tough issues have been talked about quite a bit today, multi-family dwellings. One of the other things, on residential street parking, I don't think has been talked about, that how are you going to control internal combustion engine vehicles from using those parking spots. You know how many times I've tried to park in San Francisco, or downtown Sacramento and, you know, parking is a premium and are you going to control actual people, with an internal combustion engine car, from parking in those spots will be very difficult.

The other thing that we talked about, obviously, is Smart Grid, but none of the communication integration technology was really tackled. I think, actually, there were some concepts clear back in 2002 for this type of stuff that we see today, but just glad to see it's starting to actually come to reality.

So the complex issue, talked about home-based at a fixed level. A lot of this stuff is going to be at the

decision that depends on the customer. I think some of the interesting data right now that's coming out is from the textbook people, that show that even with a large battery pack how many people are still charging with level I?

The Tesla data I think's out there in the public, but I enlist you to go look at that, that significant people are charging level one. Most of the public forums, also the people with electric bikes and scooters have voiced their, you know, need for level I charging. So I think that's going to come down to the customer demand there.

Workplace charging, from our opinion, really needs to be level II. That way, for normal commute patterns, people that get to work in the morning will be done charging at noon. That's, you know, peak energy usage. Whether or not an employee will have that benefit will be probably the employer that will probably evolve that into some sort of benefit package.

And public, and I call it non-fixed parking, for things like street parking, big question, obviously. And, you know, this is one of these areas that I think Mark Duvall kind of alluded to, it's one of the unknowns that we don't know about. There's not a lot of data here, how much level I versus level II for the bikes and scooters? You know, whether level II, level III, DC fast charging, parts of me say level II charging on average is four hours.

If you ever got DC or level III charging to 15 minutes, then you could say, hey, one fast charger displaces 16 level II chargers.

How does that work into some sort of model of centralized versus distributed? And now as everybody's trying to do is now trying to make a buck with it all.

What we're doing currently, on April the 28th, we are on three automaker teams right now, primarily we'll be upgrading the public infrastructure in Sacramento to the new standard. Some of those recommendations, doing that statewide, you'll see on the next chart.

We'll also be supporting many new installations with our regional demonstration partners, which will be a more sweet application.

We will be installing the DC level III quasi fast charging refitting our hydrogen station, so we'll be having essentially a research fast charging, solar fed on the SMUD campus.

We are going to initiate a multi-family charging cost estimation study that we hope will change into a cost destination model, where we can go into apartment complexes in our service territory and more or less get some basic costs that we can feed back for people to figure out how to electrify at a certain penetration level.

And then everybody's been talking about

permitting. One of the things we did in the Sacramento area with solar is we went to all the municipal governments in the SMUD service territory and basically got all those municipal governments to accept an expedited permitting and we will be doing the same for electric vehicles.

Lastly, as all of the people here initiating Smart Grid AMI integration approaches, we've selected Silver Spring Network at the end of the year, last year, for our AMI contractor and kind of building upon a lot of that work is where we'll be heading with AMI.

So funding recommendations, update the old existing State infrastructure, I think you've seen that a couple times. It's a real low-hanging fruit and it really does put some infrastructure out there that can really help the anxiety for range.

One of the things that we did a lot of work, feedback though, is you've got to coordinate that with the Legacy drivers. It can't just be done wholesale, you need to work with the Legacy community. We actually take a look at what it takes with regards to, you know, with and without small paddle inductor chargers to make sure that the diehard supporters through all the years continue to be supported.

We also really believe a task force should really be brought to bear to come to grips with a lot of the public infrastructure. I know being more of a municipal utility, I

already have some of the city governments in our area coming out and saying what should they do. And the guidelines out there are really nonexistent. There's been no, I'll say, real, real analytic brainpower, it's all been analytical. But the types of stuff I think about are some of the same business models that site for gas stations. So what's the population density, what's the transit through-put criteria, what's the expected need versus, you know, where the chargers could be.

You know, some of the other types of things with regards to what the penetration rates are.

And then lastly, I've really been passionate about statewide building codes. You know, this was something I thought that should have been able to be done with Title 24, but I'm told it's not part of the responsibility of the Energy Commission.

I challenge the State government to form a task force to work, you know, across the board to make these types of things happen.

Lastly, workforce development, automotive technicians, the EV installation contractors. Anecdotally, in the preparation of our proposals we've had people come up to us and say, gee, what your experienced contractor can estimate in one week, I've tried to have a guy estimate and it's taken him four months. So a lot of the infrastructure

installation contractor workforce development really is going to have to be built up from the ground level. I know quite a bit of the stuff CSCI did in the southland, quite a bit of stuff we did in the northland. There's not a lot remaining, but that needs to be worked pretty soon as well.

So final thoughts, what we've done already, when you talk to other states, they're just barely getting started. Considering that we have 3,000 EVSE installations already in the State, just updating those right away is huge.

I was talking to folks from Portland and Portland General Electric, they're putting their first 30 charging stations out there. So what's kind of blasé in California, we could really, really go a long way for the first initial support.

Task force for those tough issues, those are issue we all fumble with. I think we need a coordinated approach to try to get to a lot of the issues that are -- I think the reason that it's tough is it's going to make -- you know, some of the decisions that we made in the past are going to be stranded out there, I'll come out and say it. But as some of the communication systems come in, some of the business models come in, what we have to charge for public charging, some of those legacy systems might have to be changed or swapped out, but at least in the beginning you'd

REPORTER'S CERTIFICATE

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

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

IN WITNESS WHEREOF,

I have hereunto set my hand this 22nd day of October, 2009.

Phillip Gioe

PHILLIP GIOE