MEETING

STATE OF CALIFORNIA

AIR RESOURCES BOARD

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CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

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APPEARANCES

BOARD MEMBERS

Ms. Mary Nichols, Chairperson

Dr. John Balmes

Ms. Sandra Berg

Ms. Dorene D'Adamo

Mrs. Barbara Riordan

Dr. Daniel Sperling

Mr. Ken Yeager

STAFF

Mr. James Goldstene, Executive Officer

Ms. La Ronda Bowen, Ombudsman

Mr. Tom Cackette, Chief Deputy Executive Officer

Mr. Bob Fletcher, Deputy Executive Officer

Ms. Ellen Peter, Chief Counsel

Ms. Lynn Terry, Deputy Executive Office

Ms. Analisa Bevan, Chief, Sustainable Transportation Technology Branch, Mobile Source Control Division

Ms. Mary Alice Morency, Board Clerk

Ms. Bonnie Soriano, Staff Air Pollution Specialist, Technical Analysis Section, SSD

Ms. Gayle Sweigert, Manager, Air Quality Analysis Section, PTSD

APPEARANCES CONTINUED

ALSO PRESENT

Mr. Bill Aboudi, AB Trucking

Ms. Diane Bailey, NRDC

Ms. Rosario Berretta, Daimler

Mr. Tim Brown, University of California, Irvine

Mr. James Boyd, Commissioner, California Energy Commission

Mr. Fernando Corral, Plug Power

Captain Aaron Cudnohufsky

Mr. Steve Eckhardt, Linde, North America

Mr. Stephen Ellis, American Honda Motor Company

Mr. Randal Friedman, Navy Region Southwest

Ms. Katrina Fritz-Intwala, UTC Power

Mr. Cooper Hanning, Natural Resources Defense Council

Mr. Henry Hogo, South Coast AQMD

Ms. Bonnie Holmes-Gen, American Lung Association

Mr. Edward Kiczek, Air Products and Chemicals, Inc.

Mr. Dan Krokosky, Chevron Shipping Company

Mr. Dominick Lee, VA Transportation, Inc.

Mr. Jaimie Levin, Alameda-Contra Costa Transit District

Mr. Marty Lico, Whole Foods Market

Mr. Ronald Light, West State Alliance

Ms. Kathy Long, Ventura County Supervisor

Ms. Joan Ogden, Co-Director, Hydrogen Pathways Program, Institute of Transportation Studies, University of California, Davis

APPEARANCES CONTINUED

ALSO PRESENT

Mr. Henry Pak, Hanjin Shipping

Dr. Scott Samuelsen, National Fuel Cell Research Center

Mr. Martin Schlageter, Coalition for Clean Air

Mr. Jonathan Sharkey, Councilmember of Port Hueneme

Mr. John Shears, Research Coordinator, Center for Energy Efficiency and Renewable Technology

Mr. Miguel Silva, Horizon Freight System

Ms. Gloria Stockmyer, Stockmyer Trucking, Inc.

Dr. Andreas Truckenbrodt, Automotive Fuel Cell Corporation

Mr. David Tulauskas, General Motors

Mr. Mike Upp, ClearEdge Power

Mr. Michael Villegas, Ventura County

Mr. Justin Ward, Toyota Technical Center

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PROCEEDINGS

CHAIRPERSON NICHOLS: Good morning. I'd like to call the June 23rd, 2011 public meeting of Air Resources Board to order.

And we will begin, as we normally do, with the Pledge of Allegiance. If you'll all please rise.

Please rise.

(Thereupon the Pledge of Allegiance was Recited in unison.)

CHAIRPERSON NICHOLS: Thank you.

The clerk will please call the roll.

BOARD CLERK MORENCY: Dr. Balmes?

BOARD MEMBER BALMES: Here.

BOARD CLERK MORENCY: Ms. Berg?

BOARD MEMBER BERG: Here.

BOARD CLERK MORENCY: Ms. D'Adamo?

BOARD MEMBER D'ADAMO: Here.

BOARD CLERK MORENCY: Ms. Kennard?

Mayor Loveridge?

Mrs. Riordan?

BOARD MEMBER RIORDAN: Here.

BOARD CLERK MORENCY: Supervisor Roberts?

Professor Sperling?

BOARD MEMBER SPERLING: Here.

BOARD CLERK MORENCY: Supervisor Yeager?

BOARD MEMBER YEAGER: Here.

BOARD CLERK MORENCY: Chairman Nichols?

CHAIRPERSON NICHOLS: Here.

BOARD CLERK MORENCY: Madam Chairman, we have a quorum.

CHAIRPERSON NICHOLS: Thank you very much.

I have to say that as you're going through the roll, I was waiting for that one voice that always said, "Present" when the rest of us said, "Here." Dr. Telles, I think everybody knows, has left the Air Resources Board to resume his life as a physician. And we miss him. But that was one of his hallmarks. We always knew he was here in the morning.

All right. I have a couple of announcements to make. That is, if anyone wants to testify and you did not sign up online, I would appreciate it if you'd fill out a request card. And we still need you to check in with the clerk even if you did sign in online, no matter what. I expect we're going to be imposing our usual three-minute time limit. And we appreciate it if people state their first and last name when they come up to the podium, but then put their testimony in their own words rather than reading their remarks, because the written remarks will be entered into the record.

I'm also required to ask you to look for the

emergency exit signs that are at the rear and the side of the room. In the event of a fire alarm or any other emergency, we would be required to evacuate the room and go outside until we get an all-clear signal.

So I think that's it for the official announcements.

And my understanding is that our first item of business this morning is the public hearing on the particulate matter; is that correct?

EXECUTIVE OFFICER GOLDSTENE: Well, It's a consent item, yes.

CHAIRPERSON NICHOLS: Oh, that's a consent item. Okay.

EXECUTIVE OFFICER GOLDSTENE: We have two consent items first.

CHAIRPERSON NICHOLS: Okay. Sorry.

EXECUTIVE OFFICER GOLDSTENE: That is one of them.

CHAIRPERSON NICHOLS: Okay.

EXECUTIVE OFFICER GOLDSTENE: And the other is about amendments to area designations for --

CHAIRPERSON NICHOLS: Yes, I see.

EXECUTIVE OFFICER GOLDSTENE: -- I mean the components in the heavy --

CHAIRPERSON NICHOLS: Okay. So the emissions

measurement allowance --

EXECUTIVE OFFICER GOLDSTENE: Right.

CHAIRPERSON NICHOLS: -- for the heavy-duty diesel compliance regulation is a consent item. And we were simply going to find out if there was anyone who had asked to testify or if any Board members wanted to take this item off the consent calendar.

Seeing none, then we are able to just go ahead and close the record.

BOARD MEMBER RIORDAN: Would you like a motion?

CHAIRPERSON NICHOLS: I think we officially close the record.

And if you have any ex partes to disclose, we still need to make sure that we disclose them. I don't see any.

Okay. Then we just need to make sure that you've all looked at Resolution 11-19. And then I would ask for a motion.

BOARD MEMBER RIORDAN: Madam Chairman, I would be happy to approve the staff presentation and recommendations and the resolution for this item 11-4-1.

BOARD MEMBER D'ADAMO: Second.

CHAIRPERSON NICHOLS: Thank you.

All in favor please say aye.

(Ayes)

CHAIRPERSON NICHOLS: Any opposed?

All right. Carries unanimously.

This is a relatively new procedure for us, so we're a little bit hesitant going through it here. But I think it's a good one where we have a relatively routine item for Board action and there isn't any public wish to testify on it.

Okay. And then the second item --

BOARD MEMBER BERG: Madam Chairman, I think it's great also to say that this particular amendment was worked on by industry, by all stakeholders, and all stakeholders agreed with the end result. And that was a very positive. Sometimes we rush over those things and we don't have them very often. So congratulations to staff.

CHAIRPERSON NICHOLS: Thank you. Thank you for pointing that out.

Okay. The next item on the consent calendar is Agenda Item 11-4-2, which is to consider the approval of some proposed amendments to the area designations for state ambient air quality standards.

And, again, I guess I should ask the clerk if any witnesses have signed up to testify on this item.

BOARD CLERK MORENCY: No.

CHAIRPERSON NICHOLS: No.

Okay. Are there any Board members who would like

to take this item off the consent calendar?

If not, then we can close the record. And all the staff recommendations have been entered into the record and any written submissions that we had. And we have not been asked to extend the time period, so I will officially close the record on this one. This is one that's similar to an action we took on PM a month or two back.

May I have a motion then?

BOARD MEMBER RIORDAN: Madam Chairman, I'd be happy to move the staff recommendation and the resolution that is before us.

CHAIRPERSON NICHOLS: All right. Do I have a second?

BOARD MEMBER BALMES: Second.

CHAIRPERSON NICHOLS: All right. All in favor please say aye.

(Ayes)

CHAIRPERSON NICHOLS: Any opposed?

Okay. Again, this is carried unanimously.

And we can now move to an informational report on the status of fuel cell and hydrogen technology and infrastructure. And I see we have a panel here of distinguished guests to assist us in this effort.

Just to say a few words here. California has

been working for a long time on zero emission vehicles, the distributed generation, and other technology development programs that have touched on the topic that we're about to consider here today. The purpose of this item is to give us an overview of how fuel cells and hydrogen play a crucial part in achieving clean air and a healthy environment. And I think we have been accused, I would say it in those terms, of being an agency that has a particular bias in favor of fuel cells. And I'm very proud of the fact that we have played as critical a role as we have over the years in advancing this technology. I don't think it's a bias that's against any other form of technology. We have maintained our commitment that our goal here is clean air and reducing our impact on greenhouse gases worldwide. And we believe, and increasingly we now have good evidence to support the fact, that this is one technology which can play a critical role in getting us to where we want to go.

So with those few words, I guess I'd like to ask Mr. Goldstene to introduce this item and our panel.

EXECUTIVE OFFICER GOLDSTENE: Thank you, Chairman Nichols.

As you know, the Board established the zero emission vehicle, distributed generation and various other regulations and programs that foster the development and

deployment of cleaner or zero emission technologies. The deployment of fuel cells and hydrogen is a part of the strategy for reducing smog-forming and climate-change emissions in order for the state to attain its air quality requirements and environmental policy goals.

In-house analyses have indicated that in order for the transportation sector to achieve its fair share reductions of climate change emissions by 2050, the light-duty vehicle fleet in California must consist almost entirely of vehicles using hydrogen fuel cells, battery electric vehicles, and plug-in hybrids fueled by biofuels. In addition, significant emission reductions can be achieved through the use of fuel cells in stationary applications to generate power, heat, and in some cases hydrogen.

In the following presentation, staff and stakeholders will present the status and challenges of deploying fuel cells in stationary and mobile applications.

I'm now going to turn the presentation over to Analisa Bevan of the Mobile Source Control Division, who will provide an overview of today's activities.

Analisa.

SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: Thank you, James.

I'll bring up our presentations.

(Thereupon an overhead presentation was presented as follows.)

SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH

CHIEF BEVAN: Good morning, Chairman Nichols and Board members. Today a collection of representatives from industry, academia, and public interest groups will present you with an overview of the status of hydrogen and fuel cell as used in vehicle and stationary applications. We are providing this technology showcase in order to prepare you for several regulatory decisions coming this fall that may heavily rely on these technologies for optimal success.

Presentations will include a brief overview of what we've done to date to support hydrogen and fuel cells and a primer on why hydrogen is of interest from an energy and environmental standpoint. We'll hear reports on the status of fuel cell technology, how well they're performing, their durability, and their cost productions.

In our presentations from industry we've asked presenters to provide you with a vision for the business case and commercialization path for fuel cells and hydrogen as well as to highlight any specific challenges they face in bringing fuel cells and hydrogen to market in California.

Finally, we would like to leave you with a sense of what actions are needed to ensure success for fuel cell and hydrogen adoption and commercialization.

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SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: We're devoting a pretty generous amount of time on your agenda to discuss this technology. Why is it so important to us, you may ask. This slide may look familiar. We've presented it a couple of times to illustrate the way in which our vehicle fleet will need to rapidly transition to electric drive in order to meet an 80 percent reduction in greenhouse gas emissions by 2050, as Mr. Goldstene alluded to in his opening remarks.

This graph shows a fleet mix scenario that has changed the 80 percent reduction target. In this scenario nearly all of the cars on the road are electric drive. While we expect that battery electric vehicles and plug-in hybrids can make up a good chunk of that fleet, in order to reach the vast majority of the market fuel cell vehicles with driving range and refuel times similar to what we experience now with gasoline cars will be needed. An introduction of those vehicles into the new car sales market needs to begin in the very near future in order to build the population to the level shown here.

So we feel it is important to relay to you the

status of this technology, as it plays such an important role in reaching our climate change goals.

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SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH

CHIEF BEVAN: So what has California been doing to support hydrogen and fuel cell commercialization to date? We've been a very active partner in hydrogen and fuel cell commercialization since the late 1990s. With the formation of the California Fuel Cell Partnership and the California Stationary Fuel Cell Collaborative, we've marked our commitment to working with our industry, government, and energy provider partners to pave the way for fuel cells and hydrogen markets. These organizations formed to share information across stakeholders, remove road blocks and work together to facilitate preparation of California as a leading market for fuel cells and hydrogen.

Our more tangible contribution in the last five years has been our investment in hydrogen infrastructure. Starting with the development of California's hydrogen highway network plan in 2004 and culminating in the funding of 9 stations by the Air Resources Board and 12 stations by the CEC so far, the state has demonstrated a commitment to establishing a critically needed, efficiently distributed, and publicly accessible network

of retail hydrogen stations. The state's investment in hydrogen infrastructure totals $35 million to date.

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SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: This slide shows the cluster approach to developing the hydrogen infrastructure network, with a focus initially on the western portion of the greater Los Angeles region and the beginnings of station deployment in the San Francisco Bay Area and Sacramento. These clusters support the automakers' marketing plans for consumer placements of vehicles now and in the near term. And today's showcase will hopefully provide you with a sense of how this nascent network will need to grow and how real the cars are that will make use of it.

As you will no doubt hear from our presenters, this network is a start, but only a start, to what will be needed to support full commercial rollout of hydrogen fuel cell vehicles.

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SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: We're taking the opportunity now to update you on hydrogen and fuel cells because coming in November our Advanced Clean Cars Regulatory packages will have several components that include hydrogen and fuel cells in the compliance mix.

First, the Zero Emission Vehicle Amendments package will be proposing increases to the volume requirements for ZEVs, with expectations that the mix of technology used to meet pure zero emission vehicle requirement will rely heavily on fuel cell vehicles in the outer years of the program. Our goal for the requirements is to reach the technology cost reductions achieved through volume production by 2025.

Second, the Clean Fuels Outlet regulation will be amended to better incorporate fuels used by ZEVs, especially hydrogen. The Clean Fuels Outlet is a regulation which requires the installation of alternative fueling outlets when a specified number of alternative fuel vehicles reaches the market. This acts as a backstop, ensuring that new fuel is available to support emerging alternative fuel vehicles.

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SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: The program we've laid out for you today will be a series of panels covering introductory groundwork on energy and environment, stationary applications, fuel cells used in motor vehicles, and infrastructure. Each panel will be seated up here with me to give their presentations. And at the end of each panel session, hopefully we'll have time for questions and

answers.

At the conclusion of our last panel, we'll move to a tour of exhibits outside in the courtyard downstairs where we will be able to see examples of the technologies being presented.

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SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: So without further cutting into our agenda of expert speakers, I will now turn the presentation over to our first introductory panel. We will hear from our sister agency, the California Energy Commission, about how hydrogen plays in California's energy future; from our colleague in the NGO community, who will share our perspective on fuel cells and hydrogen from a renewable energy and overall system efficiency standpoint; and from our research partner at UC Davis to provide an overview of how hydrogen stacks up environmentally compared to other motor vehicles fuels.

So we'll start with a presentation from Commissioner James Boyd from the California Energy Commission.

CEC COMMISSIONER BOYD: Thank you, Analisa.

Good morning --

CHAIRPERSON NICHOLS: Good morning. No stranger to the Air Resources Board.

CEC COMMISSIONER BOYD: -- Chairman Nichols and Board members. It's great to be back, and I appreciates the invitation to participate in this showcase of stationary mobile applications.

And thank you for recognizing the role that the Energy Commission plays in this arena. As most of us know, our two agencies are literally joined at the hip - energy, air quality energy, environment energy, climate change, you can't separate them. So we spend long hours and the staff spend long hours working together on a variety of issues.

But it's particularly pleasing for me to be here and hear about this technology, which of course I followed as a member of the staff of the Air Board long ago. And So I'm personally pleased to see progress in the development of what many of us consider the ultimate clean fuel.

I'm giving only an oral presentation. I hear today -- well, I've seen advanced previews of some of the presentations and I knew the subject would be very thoroughly covered. I may choose to provide you some additional information because in five minutes I couldn't possibly tell you all that the Energy Commission has done down through the years in the fuel cell area. But I'll comment on some overarching policies from an energy

perspective that certainly touch on some of our role in hydrogen.

In many ways the development and use of hydrogen are centered on energy either as a fuel or, as many believe, as an electricity source, one way or another; which will explain why the Energy Commission has had and continues to have a fairly significant role in this area.

As a fuel, we see and have seen hydrogen as a major long-term contributor to displacing petroleum in the 2020 to 2050 time frame and helping us achieve energy diversity goals adopted by both the ARB and the CEC.

We also see hydrogen as a significant option to achieve reductions of greenhouse gases and criteria air pollutants, something we've both worked on together for a long, long time.

As an electricity source, we've added hydrogen to the list of renewable electricity options for quite some time. Now, to help achieve our 33 percent renewable portfolio standard and even more so the idea that fuel cells are expected to be a major component of our state's distributed generation goals and program, particularly since Governor Brown has really emphasized the role of distributed generation in our electricity energy future.

And even though we are just seeing some of the earlier stages of development, we've seen lots of and paid

for lots of research and development. We're now seeing demonstration and deployment of fuel cell technology. We expect hydrogen fuel and electricity projects will produce many of the high technology jobs that this state is noted for, and we certainly look forward to those opportunities.

The Energy Commission has two main tracks for hydrogen work, stationary and mobile source. I'll start off with mobile source since it's perhaps more familiar. And of course we've been a player with your agency for quite sometime in the fuel cell partnership, managing some of the programs and always participating as a charter member of that activity. And, finally, after years of collectively working together, succeeded in seeing AB 118, the so-called Alternative Fuels and Vehicle Technology Program, passed a few short years ago to provide money to the Energy Commission and the Air Resources Board to invest in alternative fuels and vehicle technology for our future.

The Energy Commission has made some substantial awards and plans to do more, $16 million awarded, to develop the first-phase hydrogen fueling station network at eleven sites in southern California, the San Francisco Bay Area, and in Sacramento. One of the projects of course was for the transit station at AC Transit In The Bay Area. And it'll be used to fuel 12 hydrogen buses in

the Bay Area.

An additional $18 million has now been allocated and awarded, and this fall we expect to see these dollars expand the network to create the foundation for the 50,000 hydrogen vehicles that are promised by 2015.

Many of the infrastructure installers and operators who receive these funds, I note, are here to speak to you today. So you will be thoroughly briefed on those subject areas.

The CEC signed a $4 million agreement with the California Department of Food and Agriculture's Division of Weights and Measures to create a standard to dispense fuel and allow fueling stations to sell the fuel. And we all anxiously await for that project to be completed. It's underway. We hope to see the results next year.

Hydrogen projects are also eligible under the 118 program and funds have been allocated for medium-duty and heavy-duty vehicles in engine prototype development. And vehicle and component plant manufacturing plants are also eligible for these dollars, leading to my comment about jobs in our future.

I would like to note that the Energy Commission's Public Interest Energy Research Program, or PIER Program as we know it, which is before the Legislature for reauthorization we all hope, has long funded analyses and

development of stationary hydrogen fuel cell projects, including work at a host of demonstration sites and objectives to improve power density and a variety of applications in the electricity area.

I guess I'm done.

One last comment, if I might. Bioenergy and biopower are now a big issue for all of us - biofuels, biopower, all within the framework of bioenergy. These are major activities that the CEC, and for me personally, and the idea of renewable energy for hydrogen is a major objective of ours. We are suddenly seeing a huge interest in distributed generation of small fuel cells as back-up generation for lots of activities. As a result of federal requirements that fuels -- that cell tower operators and railroads and light rail systems have back-up systems, they're all turning to us suddenly for fuel cells and renewable hydrogen, and we are about to launch some significant programs there.

And in closing, I would just say the PIER Program has done incredible amounts of work on road maps for stationary fuel cells, advanced fuel cells, and of course supported as long as we legally could the vehicle arena.

So thank you for this opportunity. And I continue to look forward to working with this agency for my remaining six months on this topic. But I know the

agency will continue to work in cooperation as we have for years.

CHAIRPERSON NICHOLS: Thank you very much, Commissioner Boyd. It has been a long-term partnership, as you say, with the Energy Commission providing more than its fair share of the funding and probably taking more than its fair share of the heat for any opposition that was out there. But I think it's -- without, you know, dwelling on that aspect of it too much, I think it's a really good example of how a long-term commitment from a policy perspective to try to look for ways in which we can partner in finding technologies that will meet our policy needs has really paid off. And obviously that's the point of today's showcase, is to let people see some of the examples of things that are coming to the floor.

So I just want to thank for taking your time on short notice to come and be with us this morning and for your leadership on this issue. Thanks a lot.

CEC COMMISSIONER BOYD: Thank you.

CHAIRPERSON NICHOLS: Analisa, are you going to introduce our next speaker,

SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: Yes, I am.

CHAIRPERSON NICHOLS: Okay, great.

SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH

CHIEF BEVAN: Our next speaker is John Shears from the Center for Energy Efficiency and Renewable Technology.

MR. SHEARS: Good morning, Chair Nichols and members of the Board. Thanks for the opportunity to speak today on our hope for the future -- continuing future with hydrogen and the fuel cells.

So just make sure my technology works here.

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MR. SHEARS: So in feeding off Commissioner Boyd's remarks, I here thought it would be useful to just show the potential resource and the potential for synergies on renewable biogas. And we at CEERT are very excited about, you know, the opportunities to potentially leverage this very substantial resource here in California for use in fuel cells. This is also very compatible with Governor Brown's initiative seeking to have 12,000 megawatts of distributed generation deployed -- renewable generation, distributed generation deployed in California by 2020.

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MR. SHEARS: I won't belabor the benefits of fuel cells except to, you know, highlight the fact that from renewable resources of course we get near zero CO_2 emissions. We're always leery about always claiming zero. But functionally close enough to zero on CO_2 emissions.

And of course the great, great air quality benefits that come from the use of fuel cells. And I know under our SIP challenges there's hope for opportunity where fuel cells may help fill in for some of the black box emissions reductions the Board and air districts are seeking.

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MR. SHEARS: So we at CEERT like to think of fuel cells as a family of technologies and are thinking about how to build an ecosystem around fuel cells. And as it turns out, we have a very fine example right now with the Orange County Sanitation District. And I understand Dr. Samuelsen will be talking more extensively about this later today. But this is an example where we can take advantage of the synergies where we have biogas resources available to use to generate power so we don't need to build new capacity on the broader grid and also use surplus biogas to generate renewable hydrogen from which we can also fuel fuel-cell vehicles.

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MR. SHEARS: So indeed, besides this just being a concept, this project is actually up and running as of this spring and is in fact generating power and producing hydrogen for the fueling of vehicles.

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So speaking of vehicles, you know, CEERT and many

of the NGOs who work on clean transportation are strong supporters of fuel cell vehicles, while also being strong supporters of battery electric and various forms of plug-in electric vehicles.

We see fuel cells as having an important part to play because they have applications that, you know, we can see as being more directly linked to conventional approaches to personal transportation for the time being. And also in the medium and the heavy-duty sectors, fuel cells are more amenable to use in long haul transport.

Battery electrics have more compromise capacity at the moment, so they're more amenable to smaller, lighter vehicles; shorter trips; more suitable probably to dense urban environments. But that's not to say that batteries don't also have a role to play, and applications are being developed in the medium and heavy-duty sectors; and, in fact, in the South Coast there's work underway on drayage classic-type trucks.

But certainly fuel cell vehicles in the long run we feel have an important role to play and we can see a clearer path for more conventional applications of fuel cells, you know, setting aside the challenges that we face with the infrastructure.

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MR. SHEARS: So the infrastructure still remains

a challenge. CARB has funded fueling stations in the past. The AB 118 program through Energy Commission is continuing to do that now. And what we hope for in the future is that both the CEC through the AB 118 program can build the infrastructure to help create the market conditions suitable to help with the implementation of the clean fuels outlet regulation once that is finally formulated and put into implementation.

So we look forward to working together with both California Air Resources Board and the Energy Commission to develop a comprehensive approach to expedite infrastructure in support of the 2015 to 2017 deployment especially of the large numbers of passenger vehicles coming into California.

Thank you.

CHAIRPERSON NICHOLS: Thank you.

Any questions at this point?

We'll let you all finish the presentations, I guess. Thanks.

SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: Thank you, John.

Our next speaker is Dr. Joan Ogden from the Institute of Transportation Studies at UC Davis.

DR. OGDEN: Thanks, Analisa.

(Thereupon an overhead presentation was

presented as follows.)

DR. OGDEN: Let's see. I'll go to my first slide here.

I'm going to talk a little about the environmental performance, especially with respect to greenhouse gas emissions for hydrogen fuel cell vehicles and compared to several other alternatives.

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DR. OGDEN: One of the interesting things about hydrogen, like electricity, you can make it from lots of different things. And this gives a lot of diversity of supply. Just, for example, renewables like wind or solar or can be used to electrolyze -- power electrolyzers to make hydrogen. You can make hydrogen from a variety of biomass roots, including the biogas root that John mentioned, but also gasification. Also make it from fossil fuels, natural gas, which is the most common way that hydrogen's made today. About over 90 percent of the hydrogen in the U.S. comes from that. Or you could even use nuclear electrolysis.

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DR. OGDEN: So the energy use depend on which pathway you choose for hydrogen. All of them are not equal. And what we really are interested in in the vehicle applications is looking well to wheels. So we

have a zero emission vehicle with hydrogen. That would also be true for electric. So we have to look at all the upstream emissions. So you count all the emissions and energy use involved in energy extraction, let's say in this case producing natural gas, moving that to a hydrogen production plant, producing the hydrogen, and trucking the hydrogen to a fueling station and using it.

So I'm going to now present some comparisons on this well-to-wheel basis, comparing hydrogen to other fuel vehicle pathways. So the hydrogen fuel cell vehicle to some other fuel vehicle pathways.

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DR. OGDEN: This is a pretty complicated slide, and probably study that later on. But there are a couple of things I wanted to emphasize. I don't know if I have a pointer here.

Well, but anyway. Up in the top of this bar we have some -- we have conventional internal combustion engine vehicles - gasoline vehicles and natural gas vehicles.

Moving down we get more electrified. We have hybrid electric vehicles, things like Prius or the other hybrids that we have.

And then plug-in hybrids and battery electrics.

And then finally at the bottom fuel cells.

And these are well-to-wheels calculations that were carried out by the Department of Energy, counting up all the emissions and making, producing and using the fuel. So some of these like gasoline of course have tailpipe emissions. But hydrogen or electricity battery cars, it's just the emissions upstream of the vehicle.

And we find some interesting things when we compare this. And I'm going to go to the next slide where I'll just kind of say in words some of the highlights from this slide. I also sent I guess to Analisa the back-up material, and there's a website there if people want to look at the assumptions more.

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DR. OGDEN: Interestingly, if you make hydrogen from natural gas, which is the most prevalent way it's made today, you would reduce greenhouse gas emissions something like 40 to 55 percent compared to a gasoline internal combustion engine in a comparable car of a comparable size.

If you go to a hybrid -- gasoline hybrid, the fuel cell's from natural gas, it's probably 10 to 20 percent lower greenhouse gas emissions well to wheel, and maybe 15, 25 less than a CNG vehicle.

So the point being is even with hydrogen made from natural gas, which is a fossil fuel, you still get a

significant reduction in greenhouse gas emissions well to wheels.

If we compare now some of the other options on the chart, if we look at -- let's assume we are using the U.S. grid mix and the hydrogen from natural gas, battery EVs would have similar well-to-wheels emissions to gasoline hybrids and somewhat greater -- a little bit greater than hydrogen fuel cells. So that's kind of the average U.S.

If you take California's lower carbon grid mix, lower carbon electricity, then the well-to-wheels emissions with battery EVs are a little bit less than hydrogen fuel cells. But it's higher -- but if you made hydrogen biomass, the emissions would be higher for the EV.

So the pathways, you need to compare them carefully.

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DR. OGDEN: But now going a little bit further into the future. Just one point is that the emissions from EVs depend on the grid mix. This is a graph that was put together at MIT and it shows -- up top there we see California and U.S. grid mixes. And we're comparing the greenhouse gas emissions per kilometer for different options.

Unless you substantially decarbonize from where we are at the average U.S. now, the average U.S. mix, which is the endpoint, you don't get much benefit with electric vehicles versus gasoline hybrids. So you really need to go to a lower carbon grid to get the full benefit.

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DR. OGDEN: That's also true for hydrogen. So the greenhouse gas emissions depend on the primary energy source. For fuel cells the emissions depend on the source of hydrogen. For electric vehicles, they depend on the source for electricity. Both EVs and fuel cell vehicles could reach near zero well-to-wheels emission in the longer term if you make them from low carbon primary energy sources like renewables, for example, wind, solar, biomass, or fossil with carbon captured sequestration. It will take some time to decarbonize those primary sources, that is, to move to a lower carbon grid and to implement lower carbon hydrogen.

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DR. OGDEN: I'm going to just show, since I don't have much time left, this is from a study by the Electric Power Research Institute and the National Resources Defense Council, showing a reasonable trajectory for decarbonizing the grid in the U.S. And by 2050 you could probably cut this by two-thirds from where we are now or

maybe even more.

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DR. OGDEN: Here's a similar thing for hydrogen. This is based on a National Academy study. We show early supply of hydrogen from natural gas because that's the lowest cost way to make it. And in future supply you bring in biomass and other renewables. And again you could get this two-thirds reduction.

One more slide.

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DR. OGDEN: This is a scenario for low carbon hydrogen in California that was done by my colleague, Chris Yang, at Davis and myself. Here we look at initially -- the little blue area in the bottom is natural gas. That's how we get started. Then we phase in hydrogen from biomass and hydrogen from electrolysis with low carbon sources. And the black line shows the greenhouse gas emissions' intensity.

So you start out with a system that would be maybe a roughly 50 percent reduction from a gasoline vehicle. But you can go to very low by 2050 and even by 2030 according to this scenario.

So bottom line is there's a potential to go very low emissions with hydrogen and also electric.

Thanks.

CHAIRPERSON NICHOLS: Thank you.

SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: We now transition.

CHAIRPERSON NICHOLS: Well, let's not.

SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: Oh, sorry. Questions. Sorry.

CHAIRPERSON NICHOLS: Let's give the panel a chance to answer a few questions, or comment if anybody has any.

Yes, I think there are a couple of us do. So why don't I start with you.

BOARD MEMBER D'ADAMO: I'd like to get some information on cost and economy of scale, not just for vehicles but distributed generation; and then also for the production of electricity, looking at the fuel source issue; and, you know, how many of these need to be built before the cost comes down.

MR. SHEAR: I think probably our next panel -- some of the folks on our next panel will probably have a better sense of being able to answer those questions. I was aware that that question would be raised. But I think Katrina on the next panel is -- and the others, both on the high temperature and low temperature fuel cells, would probably be able the answer those questions.

CHAIRPERSON NICHOLS: Dr. Sperling.

BOARD MEMBER SPERLING: Yeah, I wanted to make a comment, you know, partly to reflect to a comment you made, Chairman Nichols, that resonated with me; and, that is, California really is a leader, and what we're doing here is so important, you know. In the hydrogen fuel cell area of course it's especially important because there's been a faltering in Washington on this issue. But I mean our position here is that we're biased -- if I can slightly adapt your words, Chairman Nichols, we are biased towards a low carbon future. And, you know, as we've heard from the panelists, including my brilliant colleague Joan Ogden - and I'm very pleased to have her here - you know, we don't really know exactly how this future is going to play out. We know electricity is going to play a role. We know hydrogen's going to play a role. We know biomass. And so the idea that we in California are taking a role in supporting all of these and making sure that all of them are part of the solution is so important. And, you know, the world is watching what we do here.

And so it's just wonderful to see this panel, and I'm really looking forward to the industry because, as we just heard, cost is so important in the commercialization plan. And it's so important that we in California support industry in making those investments. And so, you know, we're here as a partnership, and that's why it was great

to have Jim Boyd here reflecting the partnership with the Energy Commission. And I would point out in the past that South Coast Air Quality Management District has played, you know, a very important leadership role in getting fuel cells going, especially when our former Chairman was playing a leadership role there, Allen Lloyd.

So this is wonderful. This is beautiful. I love it.

CHAIRPERSON NICHOLS: All right. That's great.

I have a question for any of the panelists, if you'd care to comment. Because I see that the structure of our presentation today reflects, you know, really a bifurcation that we have between the stationary and mobile source applications of fuel cells, which reflects sort of the way we deal with everything in this business, it seems, in terms of looking at air pollution sources and greenhouse gas emissions. There's a stationary world and there's a mobile world. And fuel cells are fuel cells.

And I guess my question for you is, if anybody would care to comment on it, do you see synergies between these two programs and are there ways that we could benefit from a more integrated approach perhaps than we have today to get more bang for the buck, if you will, for our fuel cell program.

Anybody care to --

CEC COMMISSIONER BOYD: Looks to me like we all want to comment on this one.

CHAIRPERSON NICHOLS: Oh, okay. Good.

CEC COMMISSIONER BOYD: I'm going to disagree slightly with you that fuel cells are fuel cells. That's not -- fuel cells are fuel cells, but the technology of fuel cells and the fuels approach are different. Stationary and mobile fuel cells tend to use different technologies for that reason.

Stationary -- mobile fuel cells are really brutalized in the field by drivers in vehicles, and so they have to be incredibly robust. And so there's been a particular approach in that arena.

Stationary fuel cells are just that, stationary, and usually not subject to the kind of motion and abuse that motor vehicles are subject to.

So there have been different approaches.

But there have been and continue to be synergies, you're right on that point exactly. And in terms of the fuel source, that's where we come together. I mean as you saw from Professor Ogden's presentation, they all need hydrogen. And so where we get the hydrogen from is what we're all working on. And it may differ for the different applications, depending upon location and what happens to be in close proximity.

Biogas comes from lots of different sources and it may be better for stationary than for mobile applications unless it ends up just in the pipeline with natural gas. And, thus, you have a renewable component of what we call natural gas or methane, in any event.

So those are my comments. I think there's others coming in.

DR. OGDEN: I think with use of hydrogen it opens up some new interactions between the transportation sector and the electric sector.

One example is what you might call a tri-generation system. You start with a feedstock, could be biogas or natural gas, and you can reform that and than produce heat and power for building and also produce some hydrogen for vehicles. And I think this kind of setup is actually being used in the Fountain Valley station. That's an intriguing way of getting started or for certain applications.

So I think it opens a whole kind of new cross-talk between those two sectors in the energy system.

MR. SHEARS: Yeah, and I agree. I mean they're different technologies, a proton/electron membrane for vehicles and a molten carbonate and solid oxide, phosphoric for a stationary generally.

But certainly the reason I want to, you know,

propose us looking at this Fountain Valley project as we move forward, especially now that we have the context of the Governor's distributed generation goals, I think, you know, I want to explore -- you know, I've talked briefly with Mike Tollstrup up at staff and the Energy Commission about thinking about how we could road map to sort of maximize these opportunities. Right now, there may be some, you know, fairly obvious sweet spots. But we need to also be thinking, you know, where things are going to be 10, 15, and 20 years down the road.

So the synergies aren't necessarily just the immediate synergies, but be thinking about how we can incorporate, you know, future synergies into our thinking and our planning.

CHAIRPERSON NICHOLS: Thank you.

Others?

Yes.

BOARD MEMBER BERG: Could you comment for us, and on the layman's side of the comments, please. My recollection when we were looking at the last ZEV and talking about the future, that battery technology was a little further but in the end game probably not the answer, that fuel cells looked more promising for the endgame. In the last couple of years, how do you see the technology moving forward? Obviously you're encouraged

that fuel cells is making great strides. But how do you see that moving forward in a way towards commercialization? And do you have a feel for what type of time frame?

SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: I can take that.

I think we'll hear from our panel number three, the automakers. I previewed their presentations and talked with them, and they're going to give you kind of a technology portfolio presentation that shares how battery electric vehicles, plug-in hybrids, hybrids, other advanced technologies and fuel cells all play and the way in which they interact together to meet our goals long term.

I think you're right, that our presentation in 2009, which talked about battery electric vehicles coming to the market faster in specific applications but that long term we saw fuel cell vehicles perhaps being more cost effective, still holds. But the battery electric vehicles will fulfill a specific niche, as John mentioned, the smaller vehicle applications, shorter range trips, maybe urban environment; where fuel cells have a better role to play in the larger format vehicles and meeting longer range needs.

So really to transition our entire vehicle fleet,

we have to have technologies that meet all the different needs of our vehicle users. And so battery electrics and fuel cells both play.

BOARD MEMBER BERG: And then how about in the -- I know I said the ZEV program. But also how about in the stationary source arena then?

CEC COMMISSIONER BOYD: Let me comment first on -- Analisa used the magic word that I would use and want to amplify and, that is, portfolio. And I want to make it a diversified portfolio.

It is the policy of the Energy Commission and the energy area in total to strive for and look for a diversified portfolio of technologies and fuels; and therefore, her comments were appropriate. There are different niches for pure battery electric vehicles, for hybrid electric vehicles that utilize batteries, and for fuel cell vehicles.

And in the stationary or electricity generation arena, there remains the same diversified portfolio. It's a little more obvious with solar and wind and hopefully more biomass in the future; natural gas, as we know it today, being supplemented with renewable natural gas. And we're looking to take advantage of some of the activity in the vehicle area to help us in the electricity area.

One of the important things -- one of the

problems we deal with in electricity is the intermittency of wind and solar, and we need energy storage. And there's multiple approaches, batteries being one of those approaches. And we have a very large research project underway - ITS Davis is involved in it - with regard to how to use spent vehicle batteries as energy storage devices, maybe even in our homes eventually to absorb some of the home-based distributed generation that may be facilitated in the future.

So there are lots of synergies, lots of possibilities of crossover here. And it just drives home even more than in the past the absolute necessity, rather than desirability, the absolute necessity of our agencies working together in this arena to look for and discover these synergies earlier rather than later.

MR. SHEARS: You know, I noted on one of my slides that McKenzie & Company, one of the leading international consultants that works in this area, did a report where they noted on the vehicle side moving out towards 2020 they expected that the costs -- total costs for all of the vehicles, battery, fuel cells, advanced conventional - because conventional vehicles are going to get even more sophisticated technologically going forward - those costs of producing those vehicles are expected to converge.

Right now, batteries are the most expensive component in a battery electric and plug-in hybrid electric vehicle. So batteries in some ways face similar challenges that, you know, engineers are working on for fuel cells in terms of - and I note that on one of my slides as well - in terms of getting the weight down, reducing the cost, enhancing -- you know, improving the durability.

Batteries and fuel cells actually were born technologically around the same time, in the mid-1800s. And in fact they're related electrochemical technologies. And a lot of the approaches that are looking to increase the power of batteries actually make -- if they work, would make batteries look more like fuel cells. So there are a lot of parallels that are going on. I'm sure that the follow-up panel that talks about that, they'll be able to speak a little more about some of the developments in those areas.

BOARD MEMBER BALMES: I have one naive question that you prompted when you were talking about the differences in technology in terms of fuel cells for stationary purposes versus vehicle purposes. Could you amplify, and again in layman's terms, the basic differences in those technologies?

MR. SHEARS: Probably it would be -- it might be

better to have one of the other panels speak to that.

BOARD MEMBER BALMES: That would be fine.

MR. SHEARS: Broadly, for vehicles, they're the class of technology that is used uniformly now for fuel cell vehicles.

And on the stationary side they use different -- I'm trying to avoid -- they use the key component that allows you to derive the electricity from the hydrogen. That component, which is either -- you know, they use a different catalyst, let's use that phrase, whether they're using high temperature molten carbonate or a phosphoric acid or what's known as a solid oxide fuel cell. It's using a different approach in terms of how it's generating electricity from the hydrogen feedstock.

There was a time early on where they were playing around with solid oxides in vehicles. But pretty much all of the vehicle manufacturers have moved away from that technology application for vehicle use.

DR. OGDEN: If I could just add something quickly to that.

One of the characteristics of different kinds of fuel cells is they have different electrolyte materials and, you know, cycles, but they also operate at different temperatures. So the ones that you use on vehicles tems are actually called low temperatures fuel cells, and they

may be around 100 C, plus or minus. But some of the others operate at much higher temperatures, and that's more suitable for power generation and maybe other -- adding other cycles, molten carbonates and solid oxide.

CEC COMMISSIONER BOYD: You know, one of the things we get from these high temperature fuel cells used in stationary applications is the possibility of gaining other uses from the high temperature, combined heat and power or combined cooling, heat and power - very strong possibilities - and actually there are demonstrations of those going on right now.

BOARD MEMBER SPERLING: Let me put some of this in perspective though. You know, it would be incredible hubris for any of us as regulators, academics, advocates to say we know what 2050 is going to be like, what technologies are really going to be in place. And, you know, I think the important lesson for ARB or policymakers is to make sure that we are supporting and encouraging and incentivizing those technologies that are promising. But we don't really know, you know. We have some idea. We keep learning every year, you know. We know more. We know more since the 2009 review. We'll know more next year.

But, you know, we do know that fuel cells and hydrogen will be part of the solution. We do know that

batteries and electricity will be part of it. We know biomass -- biofuels will be. We don't know how much of each in different regions and different technologies. And so, you know, I just want to not get us ourselves too caught up in trying to predict the exact future or pick winners or losers at this point. We've done a good job of I think screening out a lot of losers and -- but we've still got a big list of, you know, potential winners.

So we don't know what the costs are going to be. We don't know, you know, the performance of these technologies. There's lots of exciting opportunities.

So I want to make sure that we don't start thinking that we're so smart that we're going to figure it all out here. And certainly when we hear from industry, I know that more thoughtful people in industry are going to say the same thing. And their challenge is they're making investments. And so our role is to make sure that we support, you know, investments that do lead to reducing oil use, reducing pollution, reducing greenhouse gases.

CHAIRPERSON NICHOLS: Thank you. That's a very good segue to the next panel.

Thank you all so much for coming and getting us started this morning.

SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: We'll turn now to our second panel,

stationary fuel cell applications. In this panel we'll hear about how stationary fuel cells are being used in a wide variety of applications, small and large, and wrap up our session with a case study of fuel cell units placed in a retail grocery setting.

And I will say a huge thank you to all of our speakers today. We had a Herculean effort to bring together all of these panels. And, unfortunately, we had one speaker unable to get from North Carolina out here. His flight just got canceled. And so I will thank you, Katrina, in advance for giving his presentation as well as your own.

And we will get started with Katrina Fritz-Intwala from UTC Power.

(Thereupon an overhead presentation was presented as follows.)

MS. FRITZ-INTWALA: Good morning. I'm Katrina Fritz-Intwala with UTC Power.

CHAIRPERSON NICHOLS: Could you move the microphone up closer to you. The system is -- yeah, thank you.

MS. Fritz-Intwala: Better?

CHAIRPERSON NICHOLS: Great. Thanks.

MS. FRITZ-INTWALA: I'm Katrina Fritz-Intwala. I'm with United Technologies Corporation. And the Power

Division is creating large stationary fuel cells, transportation fuel cells as well. So today I'm going to focus on the large distributed generation. I'm also chair of the Industry Advisory Panel to the California Stationary Fuel Cell Collaborative, which is co-chaired by Mary Nichols and Dr. Scott Samuelsen from UC Irvine.

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MS. FRITZ-INTWALA: So first, to talk about the value proposition for large stationary fuel cells for distributed generation. There's really three pieces to this. There's the economic value, the technical value, and the environmental value.

So where there is a high spark spread or there's a high cost of electricity, low cost of natural gas today, fuel cells play very well. They can achieve up to 80 to 90 percent efficiency using these large stationary systems, as John Shears was talking about, in combined heat and power applications as well as combined cooling, heat and power. And I'll explain a little more about that in the next presentation.

So right now the customers, if they see about three to five-year payback, this will make sense for them to invest in fuel cells.

Additionally, fuel cells can run in back-up power mode. So they can produce the power and heat for a

facility, for a building. I'll show you some of the different sizes of those systems today. But another economic value is that they will maintain that critical load for those businesses that are using these today.

And also there are emergency shelters or places like schools that can serve as emergency shelters that are required to maintain those power loads.

The environmental value. As you know, in California especially, with a lot of your goals related to AB 32, fuel cells can contribute greatly to the reduction in emissions. They are virtually pollution free. There is zero water consumption in producing power from a fuel cell. And they also are being used in LEEDs buildings around the country as part of the LEED certification.

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MS. FRITZ-INTWALA: So now I want to tell you a little bit about the different markets where these are a good fit. So the fuel cells play well where there is a 24/7 demand for heat and power.

So 24/7 supermarkets. There's a lot more new supermarkets being built that are a larger size, that are open 24 hours. They have a very strong need to maintain power so that there is no food spoilage in the event of an emergency.

Bottling plants, which are high heat process.

And then mixed-use residential. So the traditional sense of mixed-use residential where there is a building that has residential units and retail commercial space. But other buildings that operate like that, like a hospital, a university dormitory, a prison, a hotel, those are all also a good fit.

And then you can also use these for utility scale generation moving multiple units together.

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MS. FRITZ-INTWALA: So today we have 33 megawatts of stationary fuel cells online in the State of California. This is the commercial market for deployment, because of the support from the State of California to date. We've had great commercial traction at this point. And those are really installations across the state in various markets and industries.

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MS. FRITZ-INTWALA: So the phosphoric acid power plants. There's one at St. Helena Hospital in St. Helena. These systems today have a 20-year system life, with a 10-year stack life. I think that's important to point out. There has been a lot of progress technically to get to this point where they can compete with other technologies.

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MS. FRITZ-INTWALA: Albertson's in San Diego, which is a grocery store application.

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MS. FRITZ-INTWALA: Cox Communications for their office space and data centers.

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MS. FRITZ-INTWALA: And Whole Foods Market in San Jose, which I'll tell you more about later as well.

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MS. FRITZ-INTWALA: The molten carbonate power plants. Again, these are all the very high temperature fuel cells. They're installed at Sierra Nevada Brewing Company; a wastewater treatment plant in Tulare, which this is a renewable fuel application installation; Cal State Northridge; and the Sheraton Hotel in San Diego.

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MS. FRITZ-INTWALA: And solid oxide power plants, they're installed at eBay in Silicon Valley. These are multiple hundred-kilowatt units ganged together for multi-hundred kilowatt output. And Google in Silicon Valley as well.

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MS. FRITZ-INTWALA: So I quickly want to talk about the Self-Generation Incentive Program in California, which is a key policy enabler. This program was suspended

in January. And the Public Utilities Commission is currently working to reinstate the program with a new proceeding. But this has really hindered our commercial progress in the State of California. This is very important.

We had a lost traction. There were hundreds of units being installed. And we have not been able to proceed with customers this year without that California incentive. So getting this back online quickly is very important.

Additionally, the Emerging Renewables Technology Program, which Commissioner Boyd referred to, is critical for the small back-up power units as well in getting that back online.

Thank you.

CHAIRPERSON NICHOLS: Thanks.

SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: Thank you, Katrina.

Our next presentation is from Mike Upp at ClearEdge Power.

MR. UPP: Thank you.

It's a little bit like the Gong Show, right?

(Laughter.)

CHAIRPERSON NICHOLS: Yeah. That thing is brutal, I know.

(Thereupon an overhead presentation was presented as follows.)

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MR. UPP: So I'm going to talk a little bit about small scale or small footprint fuel cells. They go across a wide array of applications and industries, a lot of which Katrina referred to. But I think the one I would point out is the Japanese model.

Literally there are over 10,000 about 1 kw fuel cells installed in Japan providing combined heat and power in distributed mode and -- sorry about that -- providing, you know, across their whole country. And I think they've done a very good job of mixing government and industry to come up with a way to really quickly deploy these units, and we're going to see that significantly grow.

Also small fuel cells would fall into the back-up power for telecom towers, as someone was referring to earlier; baseload heat and power; autos; and for forklift applications.

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MR. UPP: So from a real I guess what I would call a primer on how a CHP small footprint fuel cell works, simply takes natural gas into a fuel processor, it re-forms that into hydrogen. That hydrogen then simply goes through a series of membranes. People were talking

earlier about the difference. This is kind of a hybrid technology between auto and the high-end like UTC fuel cells. It's about 700 degrees centigrade in that processor. And it's producing hydrogen that then goes through a power inverter and is converted to DC power -- or, I'm sorry, to AC power. That AC power is then just connected to someone's panel just like it was powered from the grid. And then the heat, that is the byproduct, is then put through a hydronic system and will heat domestic hot water, space heating, radiant floor heating. Anything you're going to use heat for, you can use the heat from one of these small fuel cells.

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MR. UPP: I think for this audience probably one of the most important things I can talk about is what is the impact on the environment. Now, doing a number of these presentations, people always say, "Well, you guys are not renewable. You run on natural gas." But the reality is that if you look at a 5 kw combined heat and power fuel cell, it's going to produce about 90 megawatts of heat and power on an annual basis. To create that same amount to the California grid, you're going to use about 6400 therms of natural gas and create 34 tons of carbon. If you a use a 5 kw fuel cell, you're going to use about 3800 therms. And that is going to reduce your carbon

footprint by about 37 percent and your fuel cost compared to the grid by about 40 percent.

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MR. UPP: And if you look on a much grander scale - and the way we like to think about this is kind of the mid-game, not the endgame for us. But 20,000 5 kw fuel cells would produce about 860,000 megawatts of power and about a million megawatts of heat. And the impact on the environment would literally be taking 240,000 tons of carbon out of the environment and literally reducing NOx and SOx to zero.

So, yes, it's not completely renewable today. But the fact is that if you can reduce the carbon footprint using this technology tomorrow, or even today, and reduce it by 37 percent, it's a great step forward.

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MR. UPP: I wanted to just take a minute here. Somebody asked about costs earlier. I thought it would be very good to be very upfront about what the real numbers are today, and to also show you by using the same customer's slide with SGIP and without SGIP.

This first example is with SGIP. You can see that this customer is going to save about $10,000 a year by installing this in a high-end residential application. And their payback is going to be about 4.9 years. And it

makes the net system cost to that customer with SGIP and the federal tax credit of about $60,000.

If you take SGIP out of the picture, it increases that payback by about a year and -- well, let's say a year and a third. Most customers today on technology investments are looking for a payback of less than five years. So the SGIP is definitely an enabling rebate to the market, if you will, that was causing customers to buy, and it's now got many customers paralyzed or canceling orders. So I can't say enough to you about encouraging you to help get that program back on line.

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MR. UPP: I won't read all of this slide because I've got 13 seconds left. But I would want to hit two other things on here.

One is, on any energy generation at point of use, we've got a number of pilot projects going with utility companies today. And one of the reasons that they're looking at using our technology is to reduce choke point on the grids. So instead of having to dig new trenches to lay high voltage lines to urban congestion points, they're putting in fuel cell demonstration projects to prove that they can deliver peak power at the point of use, which fits right into the whole distributed generation that you all are trying to prove here in California.

So with that, I'll just stop talking.

Thank you.

SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: Thank you.

Katrina is going to give our next presentation, which is a case study.

(Thereupon an overhead presentation was presented as follows.)

MS. FRITZ-INTWALA: Okay. So on behalf of Whole Foods Market, who could not be here today, I want to talk to you specifically about their installations in supermarkets.

So this map shows you how we use the waste heat. We use both the low grade heat for hot water - that also is for heating a building - the high grade heat that comes out of a fuel cell can be run through an absorption tiller and it can be used for cooling, for refrigeration, and for freezing. So it causes that greater overall system efficiency. And we can get up to 90 percent system efficiency with these fuel cells.

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MS. FRITZ-INTWALA: And these are some benefits that Whole Foods directly wanted me to express to you that they have been seeing so far in using these fuel cells. So as I said, they use the processed heat to the extent

they can use as much as possible to get these efficiencies.

They also can run in back up power mode. So for a supermarket, that means that when the power goes out, they can maintain their inventory. So there's an economic benefit to that. But there's also a community and societal benefit because the grocery stores are the places that need to maintain the food stores in the event of a disaster or an emergency. Whole Foods most recently experienced this is the northeast with the tornados and storms we had go through a few weeks ago. And they had some systems using fuel cells in stores that stayed up and running.

Additionally, the decision to use fuel cells was made by Whole Foods again because of that SGIP in California.

So I'm going to show you two options.

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MS. FRITZ-INTWALA: They looked at a purchase option and they also looked at a leasing option.

So if you look at the purchase option, the payback period was 4.9 years. Without the -- and that was with the SGIP. Without the SGIP, it was ten-plus years, which meant they could not do it. Now, That still -- the payback period of 4.9 years still did not meet their

internal hurdle, their required rate of return.

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MS. FRITZ-INTWALA: So we looked at a leasing option, so what is called an Energy Service Agreement, which includes everything except for fuel. And what this allowed us to do is structure this so that they had a lower upfront cash outlay, lower upfront payments. And anticipating that the cost of electricity would increase over time, so will their payments, so it allowed them to begin using the fuel cell in the store.

Again, this was possible with the SGIP. Without the SGIP, there still would have been a negative net present value.

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MS. FRITZ-INTWALA: In addition to Whole Foods, SuperValu is a supermarket company that owns chains across the country, such as Albertson's. So they also have chosen to use fuel cells in California at Albertson's stores. And this is the Albertson's store in San Diego. These are actual numbers that they're seeing environmental benefits today.

But they wanted to make sure that -- I expressed again the importance of SGIP. There's ten stores that they want to use fuel cells in -- ten additional stores, contracts that are pending. And without that additional

California incentive today, they're not going to be able to do that.

So we have lost, you know, I would say -- by the time the program's back online, it'll be almost a year of commercial traction. And that does impact our ultimate costs and the cost reduction that we can achieve with the economies of scale.

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MS. FRITZ-INTWALA: Okay. Thank you.

CHAIRPERSON NICHOLS: Thank you.

SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: So do we have any questions for this panel?

BOARD MEMBER SPERLING: I have two questions.

I understand the vehicle fuel cell technology and system pretty well, where there's one fuel cell technology that's been focused on, the PEM (phonetic) fuel cells. And most of the major car companies have their own priority designs. They're on the verge of commercializing it.

But listening to the presentation on the stationary, I have some questions. One is, you know, I heard three different technologies talked about. I understood that phosphoric acid was no longer considered an important technology for stationary applications or other applications, I guess. So I'm kind of curious, is

there -- what's the sorting out on the technology? And this is important because it goes to some of the questions our Board had in terms of the synergies and interactions between the vehicle side and the stationary source side.

So that's the first question. Let me ask just that question, and then I have a follow-up.

MS. FRITZ-INTWALA: Okay. Sure.

I would say, you know, the actual material for the catalyst being the difference in those technologies probably isn't as important as making sure that we have options that fit best into different applications. Solid oxide runs at a much higher temperature. It's a newer technology, so it's still being developed. Ideally it's going to be a very high temperature system that can produce even more thermal benefit and higher efficiencies. It's not yet there today.

Phosphoric acid. There's been hundreds of phosphoric acid systems installed around the world, and there are still cost reductions happening in the technology. As I said, it's now at a 20-year life. It's not I guess passe technology. It's a mature technology to the extend that it's performing very well. There's great durability, great reliability because it has been in the field for a longer time.

BOARD MEMBER SPERLING: But that doesn't mean

it's necessarily promising for the future.

MS. FRITZ-INTWALA: If there are other alternatives that come to bear that are technically proving to be more efficient, getting higher efficiencies, and where we can see a faster period of cost reduction, yes, absolutely.

BOARD MEMBER SPERLING: Okay. And then the second question is kind of a reality check on all this. Where does California and the U.S. fit in all of this? Who's leading? Where's the markets? Where's the commercialization? How do we fit into that?

MR. UPP: Well, I would say California is by far the leader.

Is that microphone on?

Okay. And that was really higher rates than most of the rest of the country probably except for Hawaii and the SGIP program. So they were kind of the tipping point and why you saw fuel cell companies focus on California.

So for us, a relatively newcomer to the marketplace, our two markets are Korea and California because of the favorable government outlook on fuel cells. So those were the drivers. I mean, we certainly see that there's other states. We just opened an office in the northeast because there's about five states where they have that same tipping point phenomenon of high rates and

relatively good incentives.

BOARD MEMBER SPERLING: And are there any things that ARB is doing that are particularly relevant and helpful or not helpful?

MR. UPP: Well, listening to you talk about how much you are loving this interchange of ideas is very encouraging to me. Because, you know, I think sometimes we think we're kind of put off as - excuse my French - but the bastard stepchild because solar and wind get all of the -- you know, all of the fanfare, if you will. And we actually believe that we're very complementary technology and we're part of the total solution going forward. And we're seeing, I would say, a number of hybrid installations where people either don't have enough rooftop to put enough solar to drive enough power for their building so they're buying solar and fuel cells. We have an installation going in at San Diego State University that actually fits that bill.

So, you know, I think it is encouraging and I think that -- people also asked about where the costs going, and I wanted to address that as well. So we have four people whose whole job is cost reduction. And the guy who leads that team reports directly to our CFO. So it is one of the most important technology aspects of our development, because no one's ever been able to prove you

can build a small scale fuel cell and make it profitable. And we've gone from -- literally the first units we shipped cost $100,000 and we were selling them for 50. Now our cost of goods is almost break-even. And we believe that within two years we will actually be, you know, at a reasonable profit margin. So it's actually happening, but we've got to get past the brick wall that's kind of been thrown up with the rebate program getting all messed up.

MS. FRITZ-INTWALA: I'd like to add to the response on what the Air Resources Board is doing and could do.

AB 32 has our customers thinking about what they need to do in the future. That's what's really important, the end-users and their plans. Cap and trade, ultimately we expect to see an uptake in the use of fuel cells for distributed generation with that.

Just the recognition that the Air Resources Board has that fuel cells are part of the solution. Not that they are the one solution, not that we know today where everything's going to fall out, but that they need to be considered in this is very important.

And also going back to the fuel side. You know, more than the technology, the fuel ultimately is going to be what's important, what fuel's being run through those

systems. And the development of in-state biogas network is critical. I mean, all of these different technologies can run off of biogas today, but it's not readily available. And the sources that are out today are contracted already. So we need to continue that development.

CHAIRPERSON NICHOLS: That's very helpful.

Thank you.

DEPUTY EXECUTIVE OFFICER FLETCHER: Mary, if I can --

CHAIRPERSON NICHOLS: Oh, I'm sorry.

DEPUTY EXECUTIVE OFFICER FLETCHER: -- I wanted to add a little bit about what ARB's doing through the California Stationary Fuel Cell Collaborative. There is this great collaboration amongst all the manufacturers of the fuel cells. And the work that Scott Samuelsen, that you'll hear from a little later, has done to sort of bring these folks together, and Mike Tollstrup's leadership as the executive director of that as ARB, I think is helping to kind of focus on the areas that need to be looked at to promote the technologies, and there are a lot of applications that we're looking at to try to get off the ground. And one of those has to do with the dairy digesters. And the power generation off that has historically been IC engines, and we don't like that very

much. And it's costly as well to control it.

So we are looking to try to get some test programs on the ground to demonstrate the commercialization of this technology. And part of it's not as much the fuel cell itself, it's the clean up of the gas is probably one of the major expenses there.

So as the efforts go on and the commercialization, you know, proceeds, we expect those costs to come down and see really a lot of applications that could go in in a variety of areas that have multiple benefits.

BOARD MEMBER SPERLING: Is that an example where there could be an offset protocol for digesters using fuel cell technology? I mean is that the --

DEPUTY EXECUTIVE OFFICER FLETCHER: Well, we do have an offset protocol under cap and trade for manure management already. And I think the question is how do you link that into these sorts of technologies that take advantage of that aspect of it as well.

CHAIRPERSON NICHOLS: Okay. I think Dee Dee was next.

BOARD MEMBER D'ADAMO: Okay. So this is very useful. I'm getting a lot out of it.

I'd like to focus on the fuel source of the map that you provided and then the specific examples, Mr. Upp,

that you provided. Where would you put the percentage in terms of natural gas as the fuel source versus biogas or other?

MS. FRITZ-INTWALA: I actually have the actual numbers here.

The total -- I'll give it in terms of kilowatts. The total kilowatts that are installed today that are nonrenewable is about 12,000 kilowatts; and the renewable is about 10,000 kilowatts today.

BOARD MEMBER D'ADAMO: How about in terms of per -- but how many facilities?

MS. FRITZ-INTWALA: How many projects? There's about 26 facilitates that are nonrenewable and 16 that are renewable.

CHAIRPERSON NICHOLS: Did you have follow-up?

BOARD MEMBER D'ADAMO: Yeah. I'm just trying to find -- it seems that - and this is a question - the cost isn't so bad if you use natural gas because there's infrastructure and a pipeline system; so the cost goes up significantly if you have to use another fuel source?

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MR. UPP: That's true today, yes. But again, as Katrina said earlier, long term I think the -- you know, the real goal we'd like to reach is to be able to run these on biogas, because then it would be completely

renewable.

BOARD MEMBER D'ADAMO: And then I'd like to have a little bit of a discussion on AB 32 and where this fits in with capped sectors. I imagine there are certain, you know, like refineries where there wouldn't be an application. But what about manufacturing, some of the larger capped sectors versus the -- I'm thinking of food processors? The number that I've been -- of companies that I've been talking with where they're sort of hovering around the edge of falling within being a capped sector, and the application in those industries. I think it'd be helpful to see may be an example of meeting AB 32 with fuel cell technology versus another regulatory compliance method.

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MR. UPP: So specifically, you know, to us the application is high heat and high power usage. So we don't try to limit ourselves to specifically a, well, market that we would try to sell into or install at. It would be more focused on, does that company use a tremendous amount of heat and power? So we're actually in the process of putting together an implementation plan for a linen company, a uniform company that uses a tremendous amount of hot water and power to run their facility, because they're producing, you know, uniforms that they

drive around and deliver to companies. But I'm not sure that really fits what you're looking for.

CHAIRPERSON NICHOLS: It's not a second per se.

MR. UPPS: Right.

CHAIRPERSON NICHOLS: It's more of a profile of a type of business.

MS. FRITZ-INTWALA: Well, some of the sectors I showed in my first presentation, you know, such as high heat processing plants, like bottling plants, industrial pharmaceuticals, would be an example of that. The hotels and casinos, this mixed-use-residential-type area.

BOARD MEMBER D'ADAMO: Have you looked at food processing?

MS. FRITZ-INTWALA: We are looking at food processing, yes.

DEPUTY EXECUTIVE OFFICER FLETCHER: I think that some of the areas that it can -- it can play a role in a couple different areas. One of them is the utilities themselves. To the extent that they're using renewable, then it plays into 33 percent. To the extent that it's distributed, it's off the grid. So that's one area where it can play a role in terms of reducing the amount of electricity that's generated from fossil sources.

I think in the industrial side on things like food processors, to the extent that there's an obligation

that the facility has, they have a certain amount of emissions, if they install fuel cells in, that reduces their emissions obligations and, you know, helps them meet AB 32.

So I think there's a number of different areas where the applications can play a role, and I think that's something that we're looking at as well. Again, it's a situation where the cost needs to come down or the SGIP program needs to kick in.

BOARD MEMBER D'ADAMO: So it seems that for businesses that are -- or facilitates that are outside -- undistributed, outside the capped sector, what would really be driving an interest is just the incentive; there's no regulatory burden that these facilitates have; it's just the fact that there's an incentive that's out there; correct?

DEPUTY EXECUTIVE OFFICER FLETCHER: That's true. There are also potential for offset consideration -- not GHG offsets, but emission reduction credits that could be obtained through the use of them. And we do still have air quality issues outside of AB 32 and we have been looking at the potential for, you know, fuel cells to become BACT, for example, on waste treatment plants. So there are areas there where, you know, you can start with the new and than look at whether there's any potential to

retrofit these to achieve emission reductions on the criteria side, because they are -- you know, they are very clean systems.

So I think that's kind of the integration I think of how the systems play so you get GHG benefits and you get criteria pollutant benefits as well. So we are looking at areas where you can use these to replace the existing power sources and achieve emission reductions through them.

So I think there's incentives even outside GHG where fuel cells become really important

CHAIRPERSON NICHOLS: I think after today we're all going to go away with some thoughts about ways in which we might be able to integrate this better into a -- integrate fuel cell thinking better into our overall program. And that's hopefully part of the benefit of the presentation.

I would like to just --

BOARD MEMBER D'ADAMO: I'm sorry. One last -- just an update on the SGIP. I'm not that familiar with it. Is there interest in renewing it, and at what level?

DEPUTY EXECUTIVE OFFICER FLETCHER: Well, I might ask Mike Tollstrup to come up and explain it, because I'll probably screw it up.

But basically it's a program that incentivize

small generators. And it was a program in place where there was a fair amount of money but it became sort of oversubscribed. And so the money was basically -- the program was halted while the Public Utilities Commission went through and kind of is reassessing the criteria for application on the SGIP. So that is in process. I'm not sure exactly what the timing is. Katrina probably can answer that question.

CHAIRPERSON NICHOLS: Mike is coming to the rescue.

DEPUTY EXECUTIVE OFFICER FLETCHER: And there's Mike to bail me out.

But that's generally what the program is.

PROJECT ASSESSMENT BRANCH CHIEF TOLLSTRUP: Yeah, as Bob mentioned, the program is currently on hold. And it's been on hold since about I think it was last December when the PUC put it on hold. Staff has been working on a new proposal. We expect to see something come from the Public Utilities Commission, hopefully this month, but maybe next month. And then there's some delay before the program actually gets off the ground and starts, you know, getting the dollars back out there.

But it is in process. There are a number of bills also that will affect the program. The funding for the program is basically done, unless another bill, you

know, reinstitutes the funding for it. So we're waiting for one of the legislative proposals out there to take effect and reinstitute that at least for another year or hopefully longer.

But there is a lot of work going on, and we expect it to kick off here soon and the legislation to, you know, basically bring the funding back to the program, you know. But it will be almost a year since the program went on hold, and it has had a significant effect on fuel cell installations.

CHAIRPERSON NICHOLS: It's always really a big problem when we have these stop-start programs. And it's too bad we weren't aware of it earlier and in a position maybe to be helpful. I don't know if we could have been, but we could have at least been part of the discussion.

John.

BOARD MEMBER BALMES: Well, just a follow-up question. So where did the funding come from for the program before it had to stop?

PROJECT ASSESSMENT BRANCH CHIEF TOLLSTRUP: It was funding through the CPUC. So it was ratepayer based. It was about $80 million a year that was given to the program and distributed for certain technologies, the start of the solar. And they got -- you know, they went to another program. And now it's currently available for

wind and fuel cell projects. You know, some of the changes that's taking place, they will open that program up. And there will be other technologies like storage and other technologies that can meet our distributed generation standards will have access. But it is about $80 million a year that has been distributed and has been, you know, effectively distributed every year.

CHAIRPERSON NICHOLS: But surely the thinking is going to be how to integrate this more into the bigger agenda for distributed generation. And that could cause things to take even longer if we don't really bend people's attention to getting something done here.

Go ahead.

BOARD MEMBER BALMES: And then just one follow-up question to Mr. Fletcher's comments.

So both Ms. Berg and I were trying to remember, do we have any early credits with regard to greenhouse gas emission reduction in AB 32 at all?

DEPUTY EXECUTIVE OFFICER FLETCHER: Well, there are some opportunities for early reduction credits. I don't believe this is one of them. In fact, it isn't one of them.

MR. UPP: I had one more thing on SGIP.

CHAIRPERSON NICHOLS: Yes, please.

MR. UPP: So to break it apart too, what Mike was

referring to is that the plan is funded through this year, so they're actually collecting the ratepayer funds and they're accruing. It's just the program is on hold. And, you know, you have to be very forthright with your potential customer and let them know that they may or may not get it because there's no guarantee yet because they don't know what it's going to look like.

Then on the secondary level, it's now just passed to the Senate, but there was a bill that was passed that extended the right -- or the ability for the PUC to collect funds through one more year. I actually just had a meeting yesterday with Assemblyman Perez, who is the one who's actually driving the bill. He is trying to get that increased to three years so you don't have to go through this, you know, limbo period every year. Because it's definitely -- like I said earlier, it's causing a crimp in the system. So if you're inclined to reach out to somebody in the Assembly, it's Assemblyman Perez who is the main person.

CHAIRPERSON NICHOLS: This is not the Speaker but the --

MR. UPP: Yeah, Manuel Perez from the Coachella Valley in southern California.

CHAIRPERSON NICHOLS: Right. Great. Thank you.

Our legislative director is sitting in the

audience and she's paying close attention. So she'll follow up. Thank you.

All right. I think that's -- we are, as usual, running behind because we're too interested and asking questions.

But thank you all very much.

And we'll bring on the next panel.

SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: Okay. Panel No. 3 will have a motor vehicle focus. We're shifting gears literally. We'll start with a presentation from a fuel cell manufacturer to give us an overview of the core technology status and then move to a series of presentations from the automakers about their experience, plans, and needs relating to fuel cell commercialization. Finally we'll hear from our fuel cell bus demonstration partners at AC Transit to give you an update on the zero emission bus demonstration project in the Bay Area.

So we'll start with Andreas Truckenbrodt from Automotive Fuel Cell Corporation.

MR. TRUCKENBRODT: Well, thanks, Analisa and Chair Nichols and Board members. Thanks for giving me the opportunity to speak. I have a nice presentation.

(Thereupon an overhead presentation was presented as follows.)

MR. TRUCKENBRODT: While it's loading up, AFCC is a joint venture between Daimler and Ford based in Vancouver. I have five minutes, five slides, five messages. And I will definitely speak about cost, because that of course is one of the most important issues.

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MR. TRUCKENBRODT: Message No. 1 is: Fuel cells are an indispensable element of the mainstream automotive powertrain portfolio because all the benefits, like they are zero emission, they are independent from oil, the efficiency is twice as high as the internal combustion engine, we do not need to enter compromises in range or refill times, and the customer is pleased because he has all the comfort of pure electric driving.

And we've heard that key word "portfolio" before, and you will hear it more I guess from all of our speakers here because the fuel cell construct's a very important element of the whole powertrain portfolio. The battery electric vehicle plays an important role in the application of urban mobility. But the fuel cell being able to power larger vehicles and not having the range limitation is suddenly a major element.

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MR. TRUCKENBRODT: Message No. 2: The fuel cell vehicle technology is ready for the customer today. We

have made -- since the first vehicle in 1994 we've made significant progress in materials, concepts, in the analysis and simulation tools, in the vehicle integration.

We have as an example reduced the use of platinum significantly to levels where -- which are comparable to exhaust catalysts. We will work on new catalysts.

And the vehicles that you will find, that you can see later today, they are absolutely competitive with conventional vehicles in terms of the power, in terms of range and consumption, in terms of free start. They can start up to minus 15 Fahrenheit or even lower. And durability, we have reached the goal of more than 2,000 hours. Buses have proven to be able to run 10,000 hours with no problem.

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MR. TRUCKENBRODT: Message No. 3: There is one challenge remaining, and that is cost. And we are on a clear and realistic path to get the cost down to be comparable and equal to advanced conventional vehicles.

And as you can see on the chart, the benchmark is the hybrid, maybe a diesel hybrid. We are at low volumes still significantly off there to date. But the levers we are using are economies of scale, of course; manufacturing will play a very important role; and this whole thing of supplier development industrialization is a major element.

And on that chart on the left bottom you'll see that in many of the fuel cell components we are in areas where we are first to industry, whereas conventional car components -- vehicle components are well proven, you have lots of competition and suppliers. So we are getting there.

There is a lot of technologies that we are working on and we know how to get there in the technology side for the stack; catalyst; membrane; plates; for the tank, another important element; and the power electronics.

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MR. TRUCKENBRODT: Message No. 4: These are just the goals. Can we get there? And there are many studies out there.

On the left side you have the latest results from the DOE merit review just recently in Washington, how the costs of the fuel cell system is coming down to a target of $30 per kilowatt. This, by the way, are 2002 numbers, whereas the other dollars are actual dollars. So that 30 translates to 42. We are at 51 in this prognosis now, and there is still with the measures I explained a good chance to get there -- or we know we will get there.

I would also like to draw your attention on that chart on the bottom right. We also know, and this is not

only -- this is not only us, this is many studies, that fuel cell electric vehicles can even beat the battery electric vehicles in terms of cost. So ultimately the fuel cell electric vehicle is the less expensive zero emission solution. But, as mentioned before, battery electric vehicles have their value of course in the urban mobility.

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MR. TRUCKENBRODT: And my last and fifth message was: The level of the technology where we are and knowing that the cost is going to achieve the target, the OEMs are definitely committed to begin commercialization in 2015. We need, however, the commitment from all the other stakeholders as well. That is the suppliers, that is the research institutes and universities, that is government. And I do not mean we don't have the support there. But it really requires the involvement and commitment from all of those. We also need infrastructure, but we know that.

The California Fuel Cell Partnership is a great example how these stakeholders can work together. And we really appreciate the big support and the active participation of the Air Resources Board in the partnership.

Thank you.

CHAIRPERSON NICHOLS: Thank you.

SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: Our next presentation will start our presentations from car companies. We'll start with Stephen Ellis, American Honda Motor Company.

MR. ELLIS: Thank you. And while the slide's cueing up, my name is Steve Ellis, Manager of Fuel Cell Vehicle Sales and Marketing, the American Honda based in Torrance, California.

Let me run through a few slides and provide a few key messages about what Honda's been doing.

(Thereupon an overhead presentation was presented as follows.)

MR. ELLIS: The FCX Clarity we introduced in the market in 2008. We're coming up on three years of leases to real-world customers in the market.

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MR. ELLIS: This slide shows the Honda portfolio approach of vehicle technologies toward near zero and zero emission vehicles, with fuel cell electric vehicles - a long history there, since 1995 - of battery electric vehicles, plug-in vehicles, hybrid electric vehicles, and even our natural gas vehicle -- natural gas Civic, which I would add also benefits -- as a technology that benefits from investments and work in biogas.

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MR. ELLIS: On fuel cell vehicles we've been asked to provide answers to a few questions, one of those about why fuel cell vehicles.

Certainly the major issues are climate change and energy sustainability, shown in number one, where fuel cell vehicles provide high efficiency and decarbonized fuel. Others have spoken to this.

But on the transportation value side, I think what's becoming better understood is the compelling full function capability of fuel cell electric vehicles over a wide variety of vehicle platforms.

So toward greenhouse gas reduction, like here it says 80 and 50, this is a technology that will play a significant role; and certainly with petroleum reduction, with no use of oil.

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MR. ELLIS: On the greenhouse gas side, a lot has been said about that. But in this particular slide, putting emphasis on the GREET model as kind of a standardized way of measuring the well-to-wheel value of vehicles and their contribution to greenhouse gas.

Just focusing on the two green arrows pointing downward, the point being that whether it's a battery electric vehicle or fuel cell electric vehicle, both can provide zero well-to-wheel emissions both at the vehicle

side and at the fuel side based on that contribution of renewables.

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MR. ELLIS: Honda's activity today. Just let me cover a few things with where we're at. Customers have been operating the cars continuously since July of 2008. Now, this is the FCX Clarity, because prior to that we had fleet-based programs, we had cars in the hands of various fleets, including the City of Los Angeles, and we learned a lot through that.

Now we have real-world customers, paying $600 a month in a three-year lease of the vehicles, that wake up everyday and expect the car to provide the value that they're used to from vehicle transportation.

So a few quotes here. One customer said, "The excitement of driving has not gone away. I'm so grateful to have been selected to drive this amazing car."

And another recently said, "Hey, Steve, I sold my brand X luxury car. The Clarity is meeting all of my daily transportation needs."

So I think this kind of reflects this voice of the customer that may have -- they may have gone into it with uncertain aspects of how it was going to provide value to them, but it's exceeding their expectations.

Customers are consistently going 200 to 220 miles

real world between refueling. They have quite a varied commute. We have some customers with 40-mile one-way commutes, 80 miles per day and fueling every two to three days. Others are driving all over the LA Basin, including taking trips to Victorville, some business owners. That's their job is driving around southern California visiting work sites.

The navigation system in this car, it was a world's first when we put the hydrogen stations in it. Using voice command, the customer says, "Find nearest hydrogen station." And it pops them up using a GPS location base.

We do updates to that as the stations develop. But it also points out to the customer this focal point of slow station development. They don't see the changes coming as rapidly as they would wish.

But we also collaborate very closely with the fuel cell partnership: Of course the State of California - CEC, ARB - other automakers and hydrogen providers in a very credible and ongoing manner for developing a model for both where stations should be developed, the capacity of those stations, and the timing of those stations.

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MR. ELLIS: This slide kind of summarizes what's

becoming better understood, which is the great value of this full functionality of fuel cell vehicles. A 240-mile available range, customers are taking routine trips to Santa Barbara, San Diego, and out to Palm Springs, all on one tank of fuel, and of course recharging time in less than five minutes.

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MR. ELLIS: So the challenges, work in progress: On the vehicle side we're continuing cost reduction - you've heard that - and progressive steps toward deployment.

But the market preparation maybe is the bigger task and hurdles, and we're not going to get into that. But I think you can see there's a lot of work to be done there. So the collaboration with the Fuel Cell Partnership, universities, and government is critical at this time.

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MR. ELLIS: Early markets and infrastructure. I'm just going to summarize this by saying, when we launched the program, we announced three key cluster markets. It's only been within the last month that we've been able to exercise the middle one, which is in Torrance, because of a lack of stations. Now with the new what's called pipeline station, we will be able to

exercise customers in that market.

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MR. ELLIS: This is a picture almost three years ago of one of our customers refueling at the UC Irvine station. This was a research project station. A single hose dispenser -- a single dispenser at that operation. So if one of our other customers pulled up at the same time, they had to wait - not a long time, five minutes at max - but they had to wait for the other car to refuel.

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MR. ELLIS: Fast forward to today. This is the Torrance pipeline station. We have multiple dispensers, multiple hoses per dispenser, and independent control systems. So simultaneous refueling of four fuel cell vehicles can be done here. This is a world's first. But I think it also points out just, you know, how far we've come but also we're at the early stage of seeing this occur.

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MR. ELLIS: We're delivering through dealers.

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MR. ELLIS: In summary, we've learned valuable lessons, market force lessons, lessons from early station diversity.

But I think the bottom line is listening to our

customers. Their number one request is more stations. We do need accelerated hydrogen station deployment. We hope that you trust the voice of our customers that we bring to you and trust the collaborative effort of the OEMs and hydrogen providers for station needs.

Thank you.

CHAIRPERSON NICHOLS: Thank you.

SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: Thank you, Steve.

Our next presentation is from Rosario Berretta with Daimler.

(Thereupon an overhead presentation was presented as follows.)

MR. BERRETTA: Good morning. My name is Rosario Berretta and I'm responsible for the vehicle deployment here in the U.S., especially in California. Thank you so much for inviting us and to speak about fuel cell activities here in North America.

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MR. BERRETTA: With the first slide I would like to show you a portfolio of different technology where we, as Daimler, are working in different fields. As you see on the left side, you see the combustion engine in the middle, you see the hybridization of ICEs, and on the right side the zero emission vehicles which are

represented by fuel cell and battery electric cars.

So we still believe that the combustion engine has a long time to go. We can increase efficiency. We can increase also the pollutants -- or to increase the beneficial of, you know, lowering pollutants.

So if you want to go a further step to increase the efficiency, you have to make hybrid out of it. You have different kind of hybrid. You have the full hybrid, the range extender, the plug-in hybrid.

But if you want to achieve something which is a really zero emission vehicle, you have to go with the electric one, and it can be done just by battery or fuel cell.

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MR. BERRETTA: So the next slide shows -- it's a very, very interesting one because it shows, you know, the strengths of all the different drivetrains.

The first -- you see there is different scenarios. You have long distance, interurban application, or city traffic. So you see the first three arrows is mainly the combustion engine. And it's nothing new, that they can go really from long distance, interurban, and city traffic. It's not a big problem.

But you see that the range on driving with those cars just only from zero emission is really -- it's small

with hybrid drive, it's a little bit more with plug-in and range extender. But only electric cars, like with battery -- which is powered by battery or fuel cell can go the full range, you know, by zero emission.

And you see also the difference between battery electric cars and fuel cell, that battery is more -- you know, more can be applied for city traffic or interurban, and the fuel cell can go really for a longer range.

And I think important to say here is also that we as a car manufacturer - and as Professor Sperling was saying also before - we don't pick the winner yet. We know they have different advantages, you know, the different drivetrains, but we don't want to -- we don't want to choose right now the winner. And if we want to achieve, you know, by 2050 80 percent of CO_2 reduction, the only way to do it is to increase the number of electric-powered vehicles, fuel cell and battery electric cars.

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MR. BERRETTA: We started with our fuel cell activities more than 15 years ago. And so we showed different fuel cell cars, different prototypes, different demonstration vehicle.

And so we were able this year to start the world drive where we can showcase, you know, the maturity of the

fuel cell technologies; and the same time to showcase also the advantage of short refueling and long range of those cars. We were able to start in Stuttgart, and we drove around the world with three vehicles driven by journalists in 125 days and so we could showcase to the world that the technology is ready, it's there.

The only thing what we need here is the infrastructure. We were able to refuel our cars with a mobile refueler, which could, you know -- which could charge in up to three minutes. But what we need in order to bring those cars into the market, we need definitely more hydrogen station.

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MR. BERRETTA: And this is why we're trying as a car manufacturer in Germany to promote the infrastructure. We're going to build together with Linde more than 20 stations, providing money to build these stations in order to kick-start the rollout of the infrastructure. And we expect to get also some subsidies also from the German and European government.

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MR. BERRETTA: Where we are here in California you see the different stations in green which are on line right now. Only two of those we can use right now. All the other, because of technical problems, are not

operational.

The blue ones are stations which will go on line in a few months.

But it shows exactly that we need more stations. We have the cars. We have 5, 6 cars right now in customs, and we have 20 cars waiting. And our sales division is hesitating right now to give them to the customer because no station are ready to go right now. Just only two, the one in Irvine and the one in Torrance, the pipeline station.

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MR. BERRETTA: So regarding challenges, I mean technology and cost-wise we think we will be there. The infrastructure is the main focus and it should be in the future.

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MR. BERRETTA: So regarding the cost, I think this is a slide which Andreas Truckenbrodt already showed before. Between the A and the B class we were able to reduce costs. And we will be able to, until with the next generation, 2015, to reduce costs and bring it to a level where the hybrid vehicle is today.

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MR. BERRETTA: My last slide Is regarding our next program, the B class. And as I said before, we have

already six cars in customers' hands. And we will lease these vehicles for 24 months, 849 per month, which includes the service and fuel and also the insurance.

Again, we have already cars. What we are waiting now is to hand over the next cars to the customer as soon as we have more hydrogen station available.

Thank you.

CHAIRPERSON NICHOLS: Thank you.

SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: Thank you.

Our next presentation is David Tulauskas with General Motors.

(Thereupon an overhead presentation was presented as follows.)

MS. TULAUSKAS: Thank you. And for the record my name is David Tulauskas. I'm the Regional Director for State Government Relations based here in Sacramento. It's a pleasure to be here.

I will cover briefly our strategy for advanced propulsion technology and then get into the details on providing an update on our fuel cell program.

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MR. TULAUSKAS: So simply put, our advanced propulsion strategy is to develop and deploy a portfolio of technologies. There is no silver bullet to solving

today's climate change and energy security challenges. And as a global company operating in countries all around the world, there's likely -- each country will likely require a different solution to their challenges.

At this point, there's no clear technology leaders. So GM has been and continues to invest billions in everything from incremental ICE's efficiency improvement to electric motors, advanced batteries, and of course fuel cells.

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MR. TULAUSKAS: Customers have different mobility and transportation needs. And one advanced propulsion system may meet the needs better than another, depending on the customer's needs. So in other words, a small battery electric vehicle may be ideally suited for urban areas where driving distances are shorter and traffic is generally stop and go. Fuel cells provide -- are better suited for larger vehicles, longer distances, and more varied duty and driving cycles.

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MR. TULAUSKAS: A friendly face here, just to let you know that our Project Driveway, which is the world's largest fuel cell fleet demonstration program, including over a hundred vehicles, has achieved approximately two million miles and counting. And it's done that in over

five different countries, and has been refueled -- successfully refueled over 25,000 times.

There's three distinct aspects to our Project Driveway. And some of it's been in parallel, some of it's been sequential. But basically the first one is just getting the technology out and doing your basic technology demonstration program.

There's also been a group of these vehicles that have been a run-to-failure type program as part of this. And we've gained a lot of learnings in both, the basic technology demonstration program and this run to failure, which these vehicles are still going. They actually haven't failed yet.

And then, finally, the third part, and really our final phase, is to transition these vehicles into production-ready type vehicles, production intent. So these vehicles are becoming mule vehicles for production intent components, controls, and software. In other words, really close to being production ready.

And in summary, you know, our fuel cell technology is ready. We've got it on the road today.

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MR. TULAUSKAS: And this is just a quick picture to say that, you know, it's further proof that the technology is ready and it's meeting diverse customer

needs.

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MR. TULAUSKAS: GM's doing a lot of work, and a lot of people don't know this, but right here in California. We've been doing advanced vehicle and powertrain work in Torrance, California for over two decades, including work on the EV1 and more recently on the Chevrolet Volt. And GM's investment in the Volt, particularly the motors, controls and batteries, have helped tremendously in getting the fuel cell technology production ready. And GM continues to do this work here. We're growing. And this is just a picture of our facility that we -- a new facility that expanded our footprint in Torrance, California, June 9th.

CHAIRPERSON NICHOLS: My picture isn't there.

MR. TULAUSKAS: Well, I wasn't sure if I should put that one in or not. Kept it neutral.

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MR. TULAUSKAS: A little bit about our production intent design. A lot of critics talk about fuel cell technology, saying it's too far from commercialization and it's way too expensive. In less than five years, GM has cut the size of its fuel cell propulsion system in half, significantly reduced its weight, the number of parts and the use of precious metals, and at the same time

significantly increased its durability and its ability to operate in extreme weather conditions. We've been testing in minus 40 degree weather up in northern Canada for over three winters now.

So GM doesn't necessarily agree with the critics on technology readiness and we have seen significant progress on the cost issue.

And this next slide will go into a bit more detail on that cost.

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MR. TULAUSKAS: And through additional cycles of learning and by economies of scale, you know, we're estimating that we'll be on par in terms of cost parity around 2020, 2022. And we've gone from 2000 and really 9 and 10 to being approximately 11 times more expensive. So in ten years we'll see that cost be reduced significantly.

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MR. TULAUSKAS: Some remaining challenges, really threefold, related to cost, but we call it cycles of learning. We just need to get the product out there, we need to accelerate the new models, and we need to achieve economies of scale.

The next one is infrastructure investment, continue to need to expand that. In a couple years this will no longer be a chicken or egg issue. The vehicles

will be there. It will simply be an elephant in the room needing to be addressed - infrastructure.

And then finally government policy. You know, at times it, especially at the federal level, has been unclear and/or there are some policies that are lacking and we're working collaboratively to put those in place.

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MR. TULAUSKAS: And in summary, the fuel cell technology for automotive application is ready. But we need the infrastructure there to really drive the vehicle sales. As the Clarity is experiencing, and Mercedes, they can only get a very, very limited number of vehicles out there until the infrastructure is expanded.

And then, finally, stable government policy is key. And California has been doing a wonderful job, has made a lot of investments in its infrastructure, but more needs to be done.

Thank you.

CHAIRPERSON NICHOLS: All right. Thanks.

SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: Thank you, David.

Before I move on to our next presentation, I did want to note that these are not the only car companies with very active and progressive fuel cell programs. We had to make a choice who to bring into our panel. So I

want to give recognition to the other car companies, which are making significant progress.

So now we'll turn to our transit bus program with a presentation from Jaimie Levin, Alameda-Contra Costa County Transit.

MR. LEVIN: Jaimie Levin, Director of Alternative Fuels Policy for AC Transit.

I want to go on record noting that the challenge is not fuel cells. It's the five minute limitation on this presentation. But I'm going to give it my best.

(Thereupon an overhead presentation was presented as follows.)

MR. LEVIN: So our first generation buses, which launched in 2006, the numbers are there. We carried over 700,000 people. But I think what's important is to note that we improved our fuel economy by 1.6 to 2 times better than the conventional diesel bus. All the while we were reducing greenhouse gas emissions significantly using natural gas as our source of hydrogen.

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MR. LEVIN: The third generation vehicle that you'll see out front and that we're now using is significant in a number of different ways: 5,000 pounds lighter. We have a much better battery system on board. That was the Achilles' heel of our earlier generation.

We're racking up a lot of miles, a significant number here, is that we have greater than 9400 hours of fuel cell hours with no failures, no repairs, and no degradation in power. And that fuel cell keeps marching on every day. We're anxious to see that it continues to grow beyond 10,000 hours.

The UTC Fuel Cell Fleet, which is more than just our buses but other buses elsewhere in the U.S., now has over 600,000 miles. And in the Bay Area, we've carried now over a million people on our fuel cell fleet.

Let me qualify the last bullet with a couple of personal biases. Number one, I'm a daily transit user. I am a passenger. Number two, I have a Class B license and I drive the fuel cell bus, not in passenger service, but whenever I get the chance to drive it. The quote here that refers to "Like Disneyland in the Real World," that came from a Golden Gate Transit driver with over 30 years experience who also drives diesel hybrids.

We are talking a lot more than just cleaning up the air and reducing emissions here. These vehicles are extraordinary performers. We're changing the industry, the transit industry, the image of public transit. And I hope you'll get a feel for that.

Some of you -- I know Mary has been on the bus as a passenger. They really are quite remarkable.

I'm not a mechanic. We do have mechanics here, and they will tell you how enthusiastic they are working with this technology as I am talking about it.

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MR. LEVIN: Here's some numbers from the fuel cell side of this. We're looking at availability of the vehicles. And here you're looking at a 95 percent average over the last couple of years. We look for 85 percent as the required pullout for our buses. This is fuel cell, not the entire bus. But we are looking at numbers that are approaching 85 percent on availability.

In terms of miles between road calls, again, if you look at a diesel propulsion system for AC Transit, it's about 10,000 miles between road calls. And you look at these numbers with the fuel cell, and they're way off the charts. That dip that you see is just reflective of a small number of vehicles in service at early stage. And all we need is one road call and so the number dips down.

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MR. LEVIN: UTC is already making major strides with FTA and CalStart in reducing the size, the weight, and the cost while increasing power density and durability. So there's major strides being made on the fuel cell side.

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MR. LEVIN: The Bay Area program which CARB has funded, the California Energy Commission, MTC, FTA, and our local air district, is expanding this by 12 buses. It's a $65 million program. We're building two stations. We can't wait to show you the station that we're soon opening in Emeryville that the Air Resources Board is supporting.

Shared training and driving with our other operators. Golden Gate Transit will begin operating buses across the Golden Gate Bridge to San Francisco here in the very near future, in August.

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MR. LEVIN: We continue with DOE supporting the NREL evaluation of this program.

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MR. LEVIN: The key technology thresholds are:

Performance. And we're showing that. I've spoken to that.

UTC reducing the packaging.

And the fuel supply, we're going to demonstrate five to six minute fueling times per bus up to 12 to 25 buses. We're scaling that up significantly from what we started with. And we're using both solar power to produce a third of our hydrogen and we're using a stationary fuel cell fueled with directed biogas to provide a third of our

fuel at our other location.

Since everyone else took at least another minute, I'm going to do that.

CHAIRPERSON NICHOLS: You can do that. Go ahead.

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MR. LEVIN: But for a transit system, the real question's affordability equals ownership. And we've got to drive down the cost of buying these vehicles, which are over $2 million a piece. We have to be able to prove performance and maintainability. That's, can we afford to run it? And then of course the durability of the technology.

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MR. LEVIN: We are moving down that pathway. The upper part of this chart shows what we are doing now to prove technology.

The lower half is reflected in a report -- industry-based report that was submitted to the Secretary of Transportation, Ray LaHood, that we are having continuing discussions with his staff. And in fact in July we are meeting with his chief policy advisor, Paulie Trottenberg, to discuss how to roll out this program on a national basis through these Centers of Excellence deploying more vehicles while driving down costs.

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MR. LEVIN: My last slide is based on the industry projections of where we can get these buses down below a million dollars each at a unit number of -- or a production number of 400. We produce now in this country 4 to 5,000 new transit buses a year. And this is a small number in comparison to that. We are proving performance. But it's all -- and what everyone else has said, it's all in volume. We've got to drive up volume. And in transit where FTA and the federal government covers 80 percent of our capitalization cost, they need to step up in order to drive this cost down. And this is our future. There is no question about that.

Thank you for giving me the extra two minutes.

CHAIRPERSON NICHOLS: Thank you.

I know we're going to move on to the infrastructure panel, and you've all kind of set the stage for that very well. I recognize that this is a sampling only of people who are working in this space for fuel cell vehicles. But it does give us at least a bit of a taste of what's already going on out there in the marketplace, and it's very inspiring. But we are really on the cusp of something much bigger and clearly at a point where some important decisions need to be taken, not just by us but by others. I think we do have a role to play, particularly because of our standard setting role. So we

needed to have this information.

And we appreciate all of you living within -- or almost within at least the constraints of time that we gave you.

But if Board members have any specific questions, we can probably catch up with you also downstairs when we do the visit to the displays, because I assume you'll be available then as well.

Okay, great.

Then I think we'll just move on to the next panel. And thanks very much.

Infrastructure.

SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: Okay. Our final panel focused on infrastructure will I hope put it all together.

We've learned from the stationary fuel cell presenters that there are real-world applications with a variety of benefits to be had. And we've heard from the automakers that they need hydrogen stations.

We'll start this panel with a summary of just how fuel cell commercialization is forecasted to grow, and follow that with presentations from two of California's leading hydrogen infrastructure providers.

Finally, we'll showcase a project that we have helped co-fund that brings it all together in one system.

And there are several presenters who have alluded to this Fountain Valley project, which uses biogas derived from waste water to produce electricity and heat for the treatment plants and provides hydrogen for vehicles.

So we'll start with a presentation from Justin Ward, who is California Fuel Cell Partnership's Vice Chair and also represents Toyota -- works for Toyota.

(Thereupon an overhead presentation was presented as follows.)

MR. WARD: Thank you very much.

As she mentioned, my name is Justin Ward. I'm the Vice Chair of the California Fuel Cell Partnership. I'm also the advanced powertrain program manager at Toyota and responsible for our fuel cell and electric vehicle development.

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MR. WARD: Today I'm going to give kind of a real brief overview of what the California Fuel Cell Partnership is doing with regards to fuel cell vehicle and hydrogen station rollout planning. We're very active in this space and really supporting my industry towards the commercialization of fuel cell vehicles.

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MR. WARD: One of the things that the partnership always gets asked, and we get asked this I mean literally

every day, is, you know, how many hydrogen stations does it take really to kick off the commercialization of fuel cell cars?

In 2009, I would try to answer that question with our document, The Hydrogen Fuel Cell Vehicle and Station Deployment Plan. This action plan laid out a series of actions that needed to get done to really get the market ready for the commercialization of fuel cell cars. And one of the key things we identified was a need for stations.

And in that study -- or in that action plan we identified a need for about 40 stations really in the key deployment areas for the automakers would really be one of the drivers towards a commercial launch.

In 2010 and 2011, we made progress reports that further defined the station needs. And it was updated based on the updated annual automaker survey results for fuel cell cars.

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MR. WARD: When we did these development plans, many things come up that really need to be addressed as we move forward towards commercialization. And here are some of the key items:

Those include the finalization of codes and standards for the retail sales of hydrogen. And that

includes fuel metering, fuel quality, customer convenience.

Also to support business models developed by the private industry, you know, the private sector. The question is always asked, "How will these early hydrogen fuel retailers sustain their business and how do they do that in the case when their station load is relatively low because the vehicle numbers are just starting to grow? Is there a mode that makes sense for them?"

And then also we're focused on the outreach and education of early market communities. Even when we go into communities and we educate them, we find that the turnaround in those communities is relatively large and we end up having to go back in and, you know, educate a bunch of new people. So it's an ongoing process.

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MR. WARD: As was mentioned earlier, the idea of clustering the vehicle deployments and station deployments is one of the ways to kind of minimize the number of stations in order to spark the early market. And we're really starting to see that now over the past few years, these clusters to really start to define themselves. In 2010, there was about four public stations that were accessible. In 2011, we're anticipating the addition of seven additional stations. In 2012, we're looking forward

to 11 additional stations through the California Energy Commission maybe wanting a program.

So we're really excited about the progress that's been made and really seeing the formation of these cluster areas as we had talked about many years ago. What's clear is that we still need more stations. We need to make sure the cluster development makes sense. We need to make sure that the customer when they get in their vehicle, they have some confidence that they can make it to their destinations and meet their normal driving needs.

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MR. WARD: This is the latest automaker fuel cell vehicle survey. And the green line represents the latest vehicle numbers. As you can see from these numbers, it's kind of -- very exciting, at least from my perspective, that the number of fuel cell vehicles is ramping up at a faster rate than we had predicted in the previous year. And I think that goes as a testament to the commitment of the automakers towards fuel cell technology and also to the progress that the technology has made.

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MR. WARD: The other thing I mentioned before was business models. So we have to make sure we understand what are the different cost models that are available or profit opportunities they offer the retailer.

This is a study done by the Institute of Applied Energy in Japan where they looked at fuel costs on the cost-per-mile basis. This is all Japanese numbers. That's why they look the way they do.

The key thing is to understand the distribution of the costs within the fuel cost. And for gasoline, the majority of the cost, it's a raw material cost, and the delivery and station-side cost represents a fraction of the total cost.

For hydrogen it's almost exactly the opposite. The raw material cost is relatively small. But the delivering station costs represent the major function of that total cost.

We think that there is an opportunity to decrease both the station side and the delivery cost through optimization of station loading and other different technologies to drive that cost down.

These are different things that need to be considered as we look at profit opportunities for the early retail hydrogen market and also towards the sustainable hydrogen market. So we look at these both conventional and nonconventional methods to really make a business case or to help the private industry define a business case.

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MR. WARD: And then lastly as we look at the rollout of hydrogen stations, we're really looking at it from a more holistic point of view, not just from what the vehicle needs but also from, you know, what does the technology need for both the vehicle and the station side, as well as looking at some of the consumer trends and the consumer desires for accessibility and reliability and whatnot. And we're looking to kind of try to balance that as best as we can.

One of the things that has been available to us recently is the new tools. And UC Irvine STREET is one of the great new tools we hope to use to optimize that. And you'll learn about that shortly. And also to leverage the specialized working groups and task forces within the partnership.

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MR. WARD: So just to wrap it up real quick. The partnership is committed to the vehicle station rollout planning using latest informations and tools. And it's clear that additional collaborative work is needed to prepare the fuel cell market for commercialization.

SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: Yes, thank you.

Our next presentation will be from Tim Brown with UC Irvine.

(Thereupon an overhead presentation was presented as follows.)

DR. BROWN: Hi. I'm Dr. Tim Brown with the Advanced Power and Energy Program at UC Irvine. I'm going to talk about the great new tool, STREET, in its application to finding the tipping point for self-sustaining hydrogen infrastructure with minimum capital investment.

And as Justin mentioned, STREET is the Spatially and Temporally Resolved Energy and Environmental tool. It's a suite of software packages that we've developed over a number of years.

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MR. BROWN: First thing to consider in developing a new infrastructure for vehicles is that it is a coverage problem in the early years, not a capacity issue. You can't simply tally the amount of fuel available and the number of vehicles and determine if you have enough stations. You actually have to provide a sufficient network to alleviate consumer concerns about fuel availability. And we approached this problem with that in mind based on a number of factors.

We've looked at automaker market data as to where they think they have a market for these vehicles.

We have travel-time algorithms, which are the

mathematical backbone of the analysis.

We look at station land use to understand that any stations that we predict a site for, they can actually fit there and they're zoned properly and so forth.

We look at vehicle travel density to ensure that stations are located near high flow of traffic.

We look at service coverage as a way to quantify how one scenario matches compared to another.

We also look at fuel cell vehicle deployment curves to make sure the stations rollout in step with vehicles.

We consider initial or an existing hydrogen infrastructure that isn't already in place.

And we looked at some demographic data on where our vehicles are residing and where they are sold.

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MR. BROWN: So to define the regions of interest, we overlay the areas where automakers think they can sell their cars with residential land use to determine a bit more refined focus. And if we zoom in, we can see these three red areas I've outlined - basically Santa Monica and west L.A., Torrance and coastal cities, and coastal and southern Orange County.

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MR. BROWN: To get a feeling of how large these

areas actually are - it's hard to see from a map - there's over 3.1 million people live in these areas, over 600 gasoline stations, roughly two million registered cars, and over 200,000 new car sales in these areas alone each year.

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MR. BROWN: So if we examine this in more detail, we can look at how the gasoline station infrastructure in these areas plays out today. There's 636 gasoline stations currently in these areas. And this can provide a travel time from anywhere in one of these regions to a gas station in four minutes. And, thus, shown on this plot here where you have average travel time -- or actually maximum travel time on the vertical access and number of fueling stations on the bottom. And you can see at four minutes 636 gasoline stations this little red dot.

If we look forward and say how many hydrogen stations are there existing or funded, there are 14. Those are represented by the red stars on the map. And not surprisingly, those 14 hydrogen stations don't supply as good a network as the gasoline. They actually produce a maximum travel time of 18 minutes, which is not good enough for the customers.

We think the right tipping point for customer adoption where they feel comfortable with the technology,

but obviously we can't reproduce the four minutes, we think it's around six minutes travel time.

If you look at the graph and you sort of draw a mental line between the hydrogen stations and the gasoline stations, you say six minutes. That gives the impression maybe 5 or 600 hydrogen stations were needed. But that's not the case at all. It's actually much less than that.

So If I expand my plot and I move the hydrogen station -- the gasoline station's way off to the right. They're not even in the picture anymore. And we had one more hydrogen station, this one down in Orange County, we can reduce that travel time from 18 minutes down to 15 minutes. And we add one more station and reduce that travel time from 15 minutes down to 12 minutes. You see there's a very big bang for your buck here in the early years. And subsequent stations have a similar effect.

So adding seven more stations throughout the area can reduce travel time to 8 minutes, additional 3 to 7 minutes. And then four more to get down to the 6 minutes.

So in the end 32 stations can reduce travel time to just six minutes in these three regions.

We can't have just 32 stations. We need a few what we call connector and destination stations. Connector stations would provide the bridge between regions, destination of ride access to areas like Las

Vegas or Sacramento.

So in all it's going to be around 38 to 49 stations to serve the need of all southern Californians, particularly in these areas, for the coverage. If you limit the infrastructure to those quantities, roughly 40 stations, and you apply the numbers that Justin just presented on vehicle deployment, there's roughly 34,000 vehicles predicted by the automakers to go down the road in southern California in 2017. 34,000 divided by 38, including the amount of fuel used per vehicle, comes out to a throughput of around 500 kilograms a day per station already in the year 2017 just, you know, two or three years after commercialization, which is well within the range, which I think we'll hear from energy suppliers, of where they can have -- you know, they're in the black.

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MR. BROWN: So in the end, benefits of careful planning:

Reduce capital investment to just 6 or 7 percent of existing gasoline stations in the region.

Increase network effectiveness. You know, come down to a travel time of six minutes, which we feel is the tipping point.

And promote high throughput in relatively early years.

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MR. BROWN: And I want to acknowledge All of the input and partners we've had in this work, including automakers and energy companies.

CHAIRPERSON NICHOLS: Thank you.

MR. BROWN: Thank you.

SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: Thank you, Tim.

Our next presentation is from Steve Eckhardt with Linde, North America.

(Thereupon an overhead presentation was presented as follows.)

MR. ECKHARDT: I thank you. I'm Steve Eckhardt. I'm head of business development and alternative energy for Linde. And on behalf of Linde, I appreciate the invitation to come here and speak today about hydrogen infrastructure.

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MR. ECKHARDT: What I'd like to do is first give an overview of Linde and hydrogen fuel. And we have over 70 fueling stations we've designed, built, and installed around the world. That's provided over 200,000 safe hydrogen fuelings in a number of different segments, namely, automotive, bus, and material handling.

We also produce -- build and produce hydrogen,

both gaseous and liquid hydrogen from central processing plants that's delivered to customers; and also produce gaseous hydrogen with on-site technology such as steam methane reformers and electrolysis.

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MR. ECKHARDT: I just want to point out a few projects here that I think are relevant for the discussion today. AC Transit - and Jaimie talked about this a little bit - I think a point on this one, a key goal of this project is to show that hydrogen fueling of fuel cell buses can be done as practically and as quickly and as easily as it can be with diesel buses. It's critical that we show that the limited amount of space in a transit property that we can get this done. And ultimately that's what transit authorities are going to look very hard at as this go out and deploy more fuel cell buses.

In Berlin we have partnered with Shell and recently commissioned a station, a very high throughput hydrogen station. A major point about this one is that we have put in the storage and the compression equipment underground. And it's a critical step that we all need to take to ensure that the space, the very limited amount of space that's available on gasoline station forecourts can be used the way gas stations would like to use it, which is oftentimes convenience stores or car washes, where they

make very good money, and are going to be hesitant to allow us to take up significant space with hydrogen equipment.

Another point on the slide I'd just like to make is that we have received funding from the Energy Commission for three automotive fueling stations. And one of those stations is also being funded by the ARB, and are appreciative of that funding, allowing us to build three more automotive stations here in California over the next year to a year and a half.

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MR. ECKHARDT: This slide -- these numbers we've all seen several times from the partnership and the OEMs with respect to car deployment. When we look at -- at Linde when we look at this slide and we look at these numbers, what we say is, can we be ready to fuel these cars? We're talking a major change, a major rollout, orders of magnitude increase and the number of cars that will be out there. And we ask ourselves, can we fuel these cars? And The answer is, yes, we believe we have the technology and the capabilities to do that. And What I'd like to do is talk about a scenario about how we can actually make that happen.

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MR. ECKHARDT: So if we look at on this slide the

demand, taking from fuel cell cars, ultimately translating that to hydrogen demand, you see some major increases. I mean right now we have maybe a hundred to 200 kilograms a day at most being dispensed in hydrogen fueling stations, and we need to increase that to over 50,000 kilograms a day in just a few short years.

That order of magnitude increase in hydrogen demands means an order of magnitude increase in the fueling station capability. And that's going to be a big test, to make sure that we can meet that need. And so, you know, the question is, how do we ultimately do that? So what I'd like to do is translate that hydrogen demand of 53,000 kilograms a day into stations.

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MR. ECKHARDT: So if we look at the stations that are in place today, there are a number of hundred-kilogram and below stations that are operating today.

There are additional stations that will be deployed in the next year to year and a half that are anywhere from 150 to 250 kilograms a day. So I've labeled those as a medium station, on an average of 200 kilograms a day.

And then we believe we need to start deploying large and very large throughput stations that can fuel significantly more cars and significantly higher volumes

of hydrogen.

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MR. ECKHARDT: On this slide here, you can see how things ramp up. We start in 2012, at the end of 2012 when we'll have approximately 20 stations that will be fueling vehicles and meeting the needs of the cars that are out there in 2012. In the ensuing years we'll see the number of stations increasing. The medium size station, we need significantly more of those size stations. But then we believe we also need to introduce the large and the very large throughput stations. We need to introduce the very large and large throughput stations to meet the needs of those 13,250 cars all the way up to 53,000 cars in the middle of the decade on into 2017.

So while these large and very large throughput stations are a relatively small share of the total number of stations, in almost any scenario you can envision they will have to fuel a disproportionate number of cars. There will be a disproportionate number of fuelings on those large throughput station. So for that reason alone, the heavy reliance on those stations means we need to move relatively quickly to prove those stations.

And I just want to talk about two other reasons why I think we need to do that.

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MR. ECKHARDT: First is practicality. Like with diesel buses, we can fuel diesel buses, we can show how we fuel gasoline cars, hundreds, even thousands a day at a single site. But we need to show that that can be done at a hydrogen fueling station, and we need to show that we can do it while we meet our customers' expectations of three-minute fueling and not having to wait in line.

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MR. ECKHARDT: The second reason we need to do it is we need to prove the economics. We need to prove that a business model is viable in this industry for hydrogen fueling. And that's one question that always is plaguing us and that's one question we're always asked, is "Well, what's the business model? Can you make it profitable?" And what we need to do that is we need to show low life cycle costs. And that's something that we can do with these types of stations that are going to be dispensing higher volumes of hydrogen.

The investors are going to look at this, the government will look at this, and industry is going to look at this. And we need to show how it's self-explaining.

And, finally, in terms of how we do that: Linde has developed two very high throughput station technology concepts. These technologies are being deployed this year

in commercial settings in Germany, and we will be ready to deploy those in California in the next few years.

Thanks for your time.

CHAIRPERSON NICHOLS: Thank you.

SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: Thank you, Steve.

Our next presentation is from Ed Kiczek with Air Products and Chemicals.

MR. KICZEK: My name is Ed Kiczek. I'm the Global Director of our Hydrogen Energy Systems business. And thank you for the opportunity to address the Board.

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MR. KICZEK: For those of you who are not familiar with Air Products, we are the world's largest supplier of merchant hydrogen. We have three major production facilities in California, one right here in Sacramento. And we produce about a third of our total capacity right here in the State of California.

We've been active in hydrogen fueling since 1993. We've built over 130 stations in 19 countries. And currently we're fueling at a pace of over 350,000 fuelings per year. And we're nearing three-quarters of a million total safe fills.

Air Products has been recognized by the industry as the world's safest chemical company, and we've held

that distinction for several years. And to us, nothing is more important than safety.

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MR. KICZEK: We are participating in a number of several -- and several profitable commercial hydrogen fueling markets today, including forklifts, unmanned aerial vehicles, cell towers, submarines, unmanned underwater vehicles, stationary power, both high temperature and low temperature fuel cells. We use these markets actually to help us to develop many of the products leading to light-duty vehicles, because the volume was in these adjunct markets where we can develop those products.

We also recognize the need for renewable hydrogen and are currently producing renewable hydrogen at our California facilities by the purchase of renewable natural gas and a wastewater treatment facility at Orange County Sanitation District via processing the digester offgas. This is the Fountain Valley project that many people have mentioned.

And so I guess you can say technically everybody here in this room really is actually a hydrogen generator in the endgame.

Some of these experiences we've actually come to realize that current supply systems employed within the

industrial gas system are really not conducive to the transition of a fueling market, a retail fueling market, and therefore we've sought to develop fit-for-purpose supply platforms in order to meet this need. And we've been working on this for several years.

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MR. KICZEK: Within the last year, we've introduced at Air Products two new supplying modes which will drastically reduce the cost of hydrogen dispensed at the retail sites and will fill this transition -- this very much needed transition gap.

These technology platforms include composite hydrogen trailers and dual-phase liquid hydrogen trailers. Both of these technologies deliver high pressure gas to the station versus generating it on-site. And these technologies are on the road today in both the U.S. And Europe, and they're operating here in California and actually in Sacramento. And so I welcome anyone from the Board to tour our plant in Sacramento and actually see these technologies. And a portion of these technology are actually operating at AC Transit today.

We believe that these technologies will provide a dispensed hydrogen price which is competitive with gasoline today.

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MR. KICZEK: With these proprietary technologies we believe Air Products is in a rather unique position and able to offer an expandable fueling platform from small to large systems. These new supply modes allow us to make the business case at the smallest possible capacities and grow these systems with the increasing demand with just additions and some modifications on each of the sites.

The total capital required at the fueling site has been significantly reduced, resulting in lower initial transition investment due to the reduction of under-utilized assets. We can place a station on an existing forecourt for less than a million dollars.

Our strategy has been build what you need and let's expand it as the demand comes forward.

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MR. KICZEK: We're actually deploying these systems today under awards from CARB and the California Energy Comission in southern California, and we certainly appreciate those awards.

The first of the nine stations is actually currently in construction in Harbor City, California - it's pictured at the bottom right - and due to be completed in mid-July. These stations will be placed on any existing -- can be placed on any existing gasoline forecourt. They're modular. They're expandable, require

only 800 square feet of plot space. And we can expand these from the small size that they're starting at at 100 kilograms to up over a thousand kilograms a day, which more than meets the need that Dr. Brown had mentioned.

Placement of these stations has been made in conjunction with discussion with all of the OEMs, where we provided the opportunity for them to choose from over 60 sites. And they actually selected the most ideal sites where they wanted to see fueling.

As the demand grows at each site, we can manage the customer through the demand cycle.

Just 30 seconds more.

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MR. KICZEK: This project alone has an immediate impact of creating 240 jobs in the State of California, because all of our products are sourced in the State of California.

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MR. KICZEK: But the last slide here, and I'll cut it short, is we do have one challenge. And that one challenge is the lack of volume or loading of those stations in the early years, as the infrastructure needs to lead vehicles to obtain coverage. We've heard about the UCI STREET model. We believe that you need 30 stations. Once you get 30 stations, we believe that that

will seed an area and then commercial forces will take over. And with the sustained business case, you can see significant investment that will come from industry, in excess of hundreds of thousands of dollars.

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MR. KICZEK: Finally, in summary, we've reconfigured the supply chain on a fit-for-purpose basis. We believe that the infrastructure capital cost -- we've lowered them, we've cut them almost in half, and that the hydrogen fueling will be affordable to gasoline and gasoline models today.

We believe that California has an opportunity here to be a model for the rest of the world. I'd like to see California take the lead. But I'll also note that there are two foreign countries which have embraced our concepts are moving forward, and we're looking to get them approved in those counties.

Thank you very much.

CHAIRPERSON NICHOLS: Thank you.

SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: Thank you.

Our last presentation will be from Dr. Scott Samuelsen from the National Fuel Cell Research Center at UC Irvine.

CHAIRPERSON NICHOLS: Welcome.

MR. KICZEK:

(Thereupon an overhead presentation was presented as follows.)

MR. SAMUELSEN: Chair Nichols and Board members. I'm Scott Samuelsen, the Director of the National Fuel Cell Research Center. I've been asked to speak about the so called Fountain Valley or Orange County Sanitation District energy station. It's really the epitome of an interaction between the Partnership and the California Stationary Fuel Cell Collaborative, at the nexus of electricity and hydrogen.

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MR. SAMUELSEN: Looking to the interests of the partnership, it's on the automobile where we've seen examples of the manufacturers' production that's expected to be commercially launched in 2015. Hydrogen is the fuel and we're talking on this panel with respect to infrastructure.

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MR. SAMUELSEN: This presentation is really to look at the role of a stationary fuel cell in supplying that hydrogen. So I want to take a moment and just look at the application of the stationary fuel cell, where on the left the hydrogen is provided through a fuel processor, for example, a natural gas being the fuel; and

on the right the direct current is transformed to alternating current. And up there at the exhaust we try to capture as much of the heat energy as possible and utilize it to improve the overall efficiency of the operation.

We've seen from Katrina Fritz-Intwala examples today of stationary fuel cell applications and from Mike Upp the ClearEdge applications.

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MR. SAMUELSEN: What I want to focus on here is that hydrogen there just on the left of the fuel cell stack and recognize the role of the fuel processor in providing that hydrogen. In the kind of advanced fuel cells, which we call the high temperature fuel cells - those are the solid oxide or molten carbonate - the reformation is promoted by a high efficiency due to the availability of water and heat that's already at the anode of the stack.

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MR. SAMUELSEN: Well, let's bring back now the mobile fuel cell. And you see at the top the availability or source of hydrogen and then at the bottom kind of the requirement for hydrogen. So it vets the question of -- or begs the question of just combining the two as to whether the stationary fuel cell can provide the hydrogen

demand for the fueling public.

Let's look at how that might look. This is a hydrogen station that's supplied today by a liquid hydrogen truck. If instead the hydrogen came from a stationary fuel cell - there it is operated on natural gas, there it is - that fuel cell could provide electricity and heat to a local customer, say, a condominium, and then hydrogen on demand to provide the hydrogen supply for the fueling center. We call this - you see it up at the top - a high temperature fuel cell with hydrogen tri-generation, or in the rubric of the hydrogen highway report, an energy station with these three products that come from it.

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MR. SAMUELSEN: I want to transform this into a schematic just to show a particular principle here, which is, in a word, a synergism that is created by providing a higher concentration of hydrogen at the anode. It actually increases the efficiency of the fuel cell. It allows us to create the reformation at a very small amount of energy.

To demonstrate that, let's just bring in a hundred megajoules of natural gas into the fuel cell. That's going to create 47 megajoules of electricity and 53 megajoules of high quality heat. That's kind of the

conventional way that we operate a stationary fuel cell today, in this case a molten carbonate fuel cell.

Going into the tri-generation mode, let's provide another 43 megajoules of natural gas, a total of 143. That's going to allow us to generate 43 megajoules of hydrogen. And there you see the high efficiency due to this synergistic effect. Still maintaining 47 megajoules of electricity and not quite the same level of 53 megajoules, but rather 49 megajoules of high quality heat.

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MR. SAMUELSEN: So we go back to the energy station. This today is the most energy efficient and environmentally responsible manner by which to produce hydrogen 24/7, in this case from natural gas.

But we have another opportunity, which is to power the fuel cell, not in natural gas, but on a renewable gas, let's say a digester gas or landfill gas.

And then up in the top this becomes a high temperature fuel cell with renewable hydrogen tri-generation, or in other words a renewable energy station.

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MR. SAMUELSEN: An example of this, which is the last slide, is a wastewater treatment plant. The sledge over at the left is what we know it is. And the digester

to the right is where it's processed to create a more amenable product for disposable.

That digester needs heat, and that's provided today by a boiler with its associated criteria pollutant emissions. If instead we replace that boiler with a fuel cell, we can then use the heat that would otherwise be vented to provide the heat for the digester for free. No emission of criteria pollutants. In addition, we have electric power coming from that fuel cell.

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MR. SAMUELSEN: Katrina showed us earlier the City of Tulare Wastewater Treatment Plant, 900 kilowatts. There's about 9 megawatts throughout California of this product already commercially deployed.

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MR. SAMUELSEN: But here we're going beyond that. We're taking not only AC power, but remember tri-generation. So here comes the hydrogen, now biohydrogen. And this is actually a concept that's being provided, and we've heard about it today, for demonstration at the Orange County Sanitation District, indeed in Fountain Valley at the Euclid exit of the 405. Support is from the U.S. Department of Energy, the Air Resources Board, and the Air Quality Management District.

The opening is planned for August - to be

specific, August 16th - where the public can drive up and be able to refuel on biohydrogen. This particular plant is providing 300 kilowatts of electricity and about 125 kilograms of hydrogen.

Thank you.

CHAIRPERSON NICHOLS: Thank you very much. This is an exciting prospect.

So it means you drive to your local sewage treatment plant to get your car gassed up, is that basically the deal? Nothing wrong with that, I guess, if we've got the site.

It seems like it's almost -- in some ways almost too good to be true. But I can't think of any reason why it shouldn't be.

Curious about -- to ask you a completely different question, if you don't mind. But it's something that's sort of been on my mind lately, as we think about the kind of dramatic reductions that we're going to need in emissions to reach air quality standards that are likely coming in the future. And, you know, we collaborated with the South Coast Air Quality Management District on a document that basically indicates that, not next year, but sometime in foreseeable decades at least, that it's almost impossible to envision combustion as an activity that's going to be allowed really in -- at least

in urban areas like Los Angeles. And the concern is that there's so much that goes on at the individual homeowner level in terms of use of natural gas for -- in most cases at least for, you know, running your stove and your hot water heater or heating your house and so forth, and wondering if localized -- if small fuel cells at the level of what a home would use are a foreseeable likely application.

Is that a sensible way to go? Is it a way that, you know, you all are thinking about fuel cells evolving? Or is this more something that's going to be limited to larger scale buildings as we look ahead?

MR. SAMUELSEN: Well, fuel cells are being deployed commercially today, Chair Nichols, in homes. ClearEdge, Mike Upp, who spoke earlier, that's a product -- their five kilowatt product, a proton exchange membrane fuel cell that also has waste heat recovery. It's in the very early stages in the United States, with the first market, as Mike pointed out, being in California.

In Japan it's a more popular deployment that's occurring right now. Not only proton exchange membrane fuel cells but also five kilowatt solid oxide fuel cells. I expect within 20 years they'll be as popular as we have personal computers in homes today.

We're also seeing larger fuel cells being deployed for residential deployments. Katrina referred to that mixed use as an example where large fuel cell systems can serve a variety of customers, from apartment owners to the commercial operations within a mixed use sector.

So it's at the beginning stage with respect to residential. But we're already now about 20 years into commercial deployment of fuel cells at the stationary level.

CHAIRPERSON NICHOLS: Great. Thanks.

Maybe just one other comment. I guess it's sort of obvious that this panel does not include any of the people whose names are normally thought of as being emblazoned across gas stations, current fueling stations. Although there were a couple of examples I guess of co-location there.

And this is I guess really more -- maybe this is part of Analisa's wrap-up. I'm not sure. But I think it would be good to sort of update the Board on what has been the reaction of the oil industry, the petroleum industry to this emerging market to date, and any comments that you would make about why we don't see any big names here.

SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: Sure. The oil companies have been an active partner in the fuel cell partnership, infrastructure being

a primary effort that the partnership has been undertaking in the last few years. But in our discussions, they've been looking for -- and they've been involved in some of the early stations that have gone in - the Shell Santa Monica station is an excellent example of that - and have had some involvement with some of the very early stations which we funded.

But primarily, the folks which are getting the work done and at this stage are very actively bidding on the funds that we have available by the state are the folks you see sitting at the table. More of the conversation from the oil companies has been centered around being able to see the business case.

And also a very fundamental shift has taken place in California in terms of who owns gasoline stations. The oil companies have divested themselves primarily from retail stations. And so while we see stations branded by the oil companies, those are independently operated and owned concerns -- business concerns that don't have the control of the oil company over them.

So this starts to feed into one of the changes that we're looking at making with the proposed amendments to the Clean Fuels Outlook that we'll bring to you in the fall, changing who we would regulate rather than the assumption that if we regulate the retail business, we

would capture the largest providers of fuel. That wouldn't be the case anymore. And so we're looking at moving that upstream to the oil providers -- or fuel providers.

So they remain active participants in the fuel cell partnership and certainly consult on creating the business case and the path forward.

But these are the folks that are doing the work on the ground today.

CHAIRPERSON NICHOLS: Thank you.

And I guess maybe this is really for Mr. Fletcher. But do you see any likelihood that the low carbon fuel standard will lead to some of the companies that are subject to that moving in this direction?

DEPUTY EXECUTIVE OFFICER FLETCHER: I don't think in the early years of the program it will. We did look at ways to provide incentives for, you know, credits, extra credits, for example, in the early years. And it just didn't seem like it was the best approach, which is why I think they were looking at the clean fuels outlet. So I think the amount and volume of hydrogen that would be available during the domain of the early years of the low carbon fuel standard are so small that it's not likely to provide that much of an incentive.

As you go -- you know, if we look beyond 2020, I

think it can play a huge role.

CHAIRPERSON NICHOLS: Okay. Thank you.

I don't see anybody leaping forward with questions. But we also know that we have a treat in store for us in the next few minutes. So maybe I'll let you wrap up, I guess.

Analisa, did you have some final comments, and James? And then we'll go take our tour.

EXECUTIVE OFFICER GOLDSTENE: And we have one speaker who signed up.

CHAIRPERSON NICHOLS: Oh, we do have one public speaker.

All right. Well, let's finish the staff presentation.

SUSTAINABLE TRANSPORTATION TECHNOLOGY BRANCH CHIEF BEVAN: Okay. Well, I think our panel presentations today have shown that there's real progress in performance, durability, and cost, demonstrated with real-world installation and placements of fuel cells, both stationary and mobile and the use of hydrogen.

We heard a key message that work is needed on fuel for fuel cells and that there's a distinct appreciation for the recognition the role fuel cells play in our climate change policies and regulations, and a need to provide a consistent government policy and support.

Clearly we heard that infrastructure is critical, especially for the deployment of fuel cell vehicles.

I don't know how clear it came out in the presentations, but in talking with the manufacturers in preparation for this and also in prior meetings, they have cars sitting on lots waiting for infrastructure, ready to find the customers to make use of the cars.

We have an exciting future ahead of us. Fuel cells are no longer described as being ten years ago.

If I can use a personal interjection. When I first started working on hydrogen and fuel cells, I used to peg the commercialization as being right around the time my son would be ready to take his driving test. The way things are looking now, I get to drive the car for a few years before he's ready to take his test. He's seven now.

So I think this is tremendous progress. I like that there's been this measuring stick. And I was afraid that it would go the other direction. And so I'm very optimistic and enthusiastic. And I think that our panelists here today have helped us gain a view of where things are going and can help us all take that vision forward.

CHAIRPERSON NICHOLS: Well, it's been a terrific set of presentations. And I know how challenging it is to

try to condense things in short order. But it really is helpful to us to have this diversity of sources that we've been able to hear from.

So thank you all for making the effort to be with us and to help educate us as well about the opportunity.

I think that the fuel cell partnership has been a -- well, both fuel cell efforts have been remarkable in the amount of private sector involvement that they have generated as well as in the opportunities for government to really find ways to work on some of these issues that would have been quite difficult if we'd stayed in our own silos. Not to mention also the benefit of having the academic connections both with Irvine and Davis.

So this has been quite a model I think that we've also managed to create here in California in an institutional sense. And I'd like to acknowledge that as well, especially appreciation to Dr. Samuelsen for being with us today. Thank you.

And we do have one member of the public who asked to address that Board. And that is Fernando Corall from Plug Power.

MR. CORALL: Thank you. Good afternoon. I will make it brief.

My name's Fernando Corall. I'm with Plug Power. I'm Director of Sales for the Western Region of Plug

Power. And I just wanted to add my comments to several of the gentlemen and presenters. We work with their products, with Linde, with the UC Irvine. And I just wanted to give you some perspective as to the material handling side of the fuel cell industry.

Currently, there's over 1200 units being powered by hydrogen fuel cells in the United States. That represents -- we talked about throughput. That represents approximately 2,000 kilograms per day of hydrogen being consumed by forklift trucks.

Further, it's about 5,000 fuelings per week that are occurring primarily in the United States. I say that because, unfortunately, none of those numbers apply to California. In California, there is no -- there are no material handling equipment being fueled by hydrogen. And one of the reasons is primarily the cost of infrastructure. We talked about the infrastructure for the automotive industry. The infrastructure for hydrogen -- for material handling is an expensive proposition.

Commercialization of the units are almost on a -- is here. It's a capital cost. It's a wash when it comes to purchasing a hydrogen fuel cell for a lifttruck versus the batteries -- the lead acid batteries and the chargers required. The stumbling block is essentially the

infrastructure.

And that's one of the reasons why I'm here is to encourage the Board to revisit their decision to withhold funding for off-road commercial -- or off-road hydrogen fuel cells. I know that you are funding the stations for the automotive industry and for buses and so on. But I would also like to encourage you to look at hopefully funding in 2011, 2012 some stations that would be dedicated to hydrogen fuel cells powering forklifts.

CHAIRPERSON NICHOLS: Okay. Thank you.

MR. CORALL: Thank you very much.

CHAIRPERSON NICHOLS: All right. Mr. Goldstene.

EXECUTIVE OFFICER GOLDSTENE: Thank you.

Analisa I think did a great job. She and her team were fantastic. And thanks to all the panelists.

I think now -- we have until 1:00. We have real life examples out in the front on the street and on the patio of stationary and mobile fuel cells that we'd like the Board to go out and take a look at now.

CHAIRPERSON NICHOLS: I think we should combine it with our lunch break, if we can.

EXECUTIVE OFFICER GOLDSTENE: And we'd combine it with our lunch after.

CHAIRPERSON NICHOLS: Because we do have a couple of measures we have to take up this afternoon as well.

EXECUTIVE OFFICER GOLDSTENE: Right. We have a short item on the air quality matter and then the oceangoing vessel, which will take about an hour plus.

CHAIRPERSON NICHOLS: Right, which is an public hearing item.

So do you think we can do this all in an hour? We don't have an executive session scheduled today at lunchtime.

EXECUTIVE OFFICER GOLDSTENE: Right. No, I think we could be back maybe by 1:15 or so.

CHAIRPERSON NICHOLS: All right. Let's try for 1:15 then to return.

Thanks very much, everybody.

12:04 PM

(Whereupon a lunch recess was taken.)

AFTERNOON SESSION

1:29 PM

CHAIRPERSON NICHOLS: Ladies and gentlemen, as usual, we were a little optimistic about how long it would take us to get through the tour and lunch, but we're starting a few minutes late here.

And I think we're going to start with an informational item. At least I hope that's where we are -yes? - on the staff's recommendations for designations under the revised sulfur dioxide federal standard.

So, Mr. Goldstene, would you please introduce this item.

EXECUTIVE OFFICER GOLDSTENE: Thank you, Chairman Nichols.

U.S. EPA's in the process of reviewing the adequacy of all federal air quality standards. In June of last year, they revised the sulfur dioxide standard.

As a first step in implementing the new standards, states are required to submit recommendations for area designations to the EPA. Staff will provide a brief summary of the designation recommendations that were recently submitted to the EPA.

Gail Sweigert from Planning and Technical Support Division will provide the presentation.

Gail.

AIR QUALITY ANALYSIS SECTION MANAGER SWEIGERT: Thank you, Mr. Goldstene, and good afternoon Madam Chairwoman members of the Board.

(Thereupon an overhead presentation was presented as follows.)

AIR QUALITY ANALYSIS SECTION MANAGER SWEIGERT: As Mr. Goldstene mentioned, I'll be summarizing our recommended area designations for the new federal sulfur dioxide standard.

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AIR QUALITY ANALYSIS SECTION MANAGER SWEIGERT: In June of last year, U.S. EPA adopted a new one-hour sulfur dioxide, or SO_2, standard. This standard is more stringent than the previous SO_2 standards, which had not been violated in California more than three decades.

Under the Clean Air Act, state recommendations on area designations are due one year after the standard is adopted. Consistent with this time line, we submitted our recommendations earlier this month. EPA now has a year to consider our recommendations before issuing final designations and boundaries. We expect EPA's final action by June of next year.

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AIR QUALITY ANALYSIS SECTION MANAGER SWEIGERT: The new federal SO_2 standard is set at a level of 75 parts

per billion averaged over a one-hour time period. This standard replaces the previous 24-hour and annual standards, which had been in place for many years.

The new one-hour standard focuses on acute, short-term health impacts. EPA changed the averaging time because health studies showed that short-term exposures, on the order of five minutes to one hour, were strongly linked to adverse health impacts. Under the previous 24-hour and annual standards, short-term concentrations could exceed the level needed to protect public health.

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AIR QUALITY ANALYSIS SECTION MANAGER SWEIGERT: The newer health evidence for sulfur dioxide shows a stronger link between short-term exposure and adverse respiratory effects. These respiratory effects include difficulty breathing and a worsening of asthma symptoms, especially in exercising individuals.

Additional health evidence also points to an increase in emergency room visits and an increase in hospital admissions for all respiratory illnesses, including asthma, when SO_2 concentrations are elevated.

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AIR QUALITY ANALYSIS SECTION MANAGER SWEIGERT: The area designation process for SO_2 is similar to that of other pollutants. The review is based on air quality data

for a recent three-year period; in this case, 2007 through 2009. Based on these data, staff determined the designation status - in other words, does air quality meet the standard or does it violate the standard? Staff then proposed an appropriate boundary, using the criteria specified by EPA guidance. For SO_2 this included five factors: Emissions, air quality, meteorology, geography, and jurisdictional control.

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AIR QUALITY ANALYSIS SECTION MANAGER SWEIGERT: Compared with other parts of the nation, the total amount of SO_2 emissions in California is relatively small. However, SO_2 emissions contribute to PM2.5 pollution, so ongoing emission reductions remain important.

Most SO_2 emissions in California are associated with a few source categories. In particular, oceangoing vessels account for the largest portion of the statewide total, about 55 percent of California's SO_2 inventory.

A remaining large portion of the statewide SO_2 emissions comes from stationary sources. The majority of these emission come from petroleum refining, fuel combustion from sources such as boilers and process heaters, and from mining processes and cement manufacturing activities. These type of stationary sources are widely distributed throughout California.

However, the largest sources that are of most concern for SO_2 are limited to just a few areas of the state.

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AIR QUALITY ANALYSIS SECTION MANAGER SWEIGERT: Decades ago California switched from fuel oil to natural gas for generating electricity, which dramatically reduced SO_2 emissions in California. SO_2 emissions throughout the state are now close to half of what they were in 1990. Much of the ongoing reduction is due to improved controls on stationary sources and limits on the sulfur content of fuels they use.

Another large reduction is attributable to limiting the sulfur content in shipping fuels, which has especially benefited the areas with large port operations.

The next item on today's agenda deals with ARB's oceangoing vessel clean fuel regulation, which has already reduced emissions nearly 80 percent. This rule is a key PM2.5 SIP measure and it also helps to improve SO_2 air quality along California's coast and in port communities.

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AIR QUALITY ANALYSIS SECTION MANAGER SWEIGERT: The reduction in SO_2 emissions is mirrored in the ambient SO_2 air quality. This graph shows the long-term trend for the three most populated areas of California: The San Francisco Bay Area, the South Coast, and the San

Joaquin Valley. In all three of these areas, concentrations are now at least half of what they were 20 years ago. In addition, they are well below the level of the new one-hour federal SO_2 standard.

While there is a gap in the trend analysis for the San Joaquin Valley due to incomplete data, the recent values show low levels compared to the new federal standard. Similar trends hold true for other parts of the state.

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AIR QUALITY ANALYSIS SECTION MANAGER SWEIGERT: Currently, California has ambient SO_2 monitoring networks with a total of 39 sites. These sites are located throughout the state, with the most populated areas having the largest number of monitors. Concentrations at all sites are far below the level of the new 75-part-per-billion standard, with maximum concentrations in urban areas ranging from 20 to 35 parts per billion.

Concentrations in nonurban areas that are not located near large stationary sources are much lower, ranging from 2 to 17 parts per billion.

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AIR QUALITY ANALYSIS SECTION MANAGER SWEIGERT: In addition to the statewide network, there are several special purpose monitoring networks in areas with

significant SO_2 sources. One of these areas is the Long Beach / Los Angeles port complex. As part of their clean air action plan, the ports established a six-site monitoring network to measure port-related pollution concentrations.

This special network has been operating for about five years, and recent data show one-hour SO_2 concentrations in the range of 34 to 62 parts per billion. Although these levels are generally higher than those measured by the ambient monitoring network, they are still below the level of the new federal standard.

We anticipate that this network will continue to operate long term, providing useful information about SO_2 and other pollutant levels in the ports area and surrounding impacted communities.

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AIR QUALITY ANALYSIS SECTION MANAGER SWEIGERT: In addition to the ports monitoring in the South Coast, the Bay Area also conducts special purpose SO_2 monitoring. A network of 15 ground-level monitors are located near or outside the property boundaries of the five Bay Area refineries in Contra Costa and Solano counties. These refinery operations are among the largest SO_2 sources in the state.

Under the District's Regulation 9, the monitors

measured downwind near-source concentrations as part of the facility operating permit.

Measured concentrations at these monitoring sites range from 1 to 56 parts per billion, all of which are below the level of the new federal SO_2 standard. As with the port's monitors, we expect this facility-related monitoring will continue operating long term.

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AIR QUALITY ANALYSIS SECTION MANAGER SWEIGERT: In addition to evaluating air quality data, the federal SO_2 standard designation process contains a new requirement that air quality be supplemented with modeling for large stationary sources.

U.S. EPA guidance focuses on sources that emit more than 100 tons of SO_2 per year.

In California, 34 facilities exceed this emission threshold and will require modeling.

While the majority of these facilities are refinery operations, the remaining large sources include cement plants, mining operations, glass manufacturers, and co-generation facilities. SO_2 emissions from facilities in California are small compared to large SO_2 sources elsewhere in the nation.

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AIR QUALITY ANALYSIS SECTION MANAGER SWEIGERT:

Over the next several months, our air quality modeling staff will be working with the local districts to develop an SO_2 modeling protocol. The larger districts will complete their own modeling efforts, and ARB staff will conduct modeling for the smaller districts.

We have committed to providing the modeling results to EPA prior to their making final area designations in June 2012.

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AIR QUALITY ANALYSIS SECTION MANAGER SWEIGERT: In summary, all SO_2 monitors in California show compliance with the new federal standard. This includes monitors in the ambient network as well as special purpose monitors. In most cases, concentrations comparable with the federal standard are well below the level of the standard.

As I mentioned earlier, staff has submitted a technical analysis to U.S. EPA in support of the attainment recommendation. Modeling for large stationary SO_2 sources will be completed as required and submitted to U.S. EPA before the area designations are made.

This concludes my presentation. And now I'll be happy to answer any questions you have.

CHAIRPERSON NICHOLS: This really isn't a question, but it's a comment for the Board members.

I think the staff was perhaps a little too plain

vanilla in the presentation to highlight this point. But as a result of having to do the additional monitoring and modeling for the SO_2 standard, which as you can see is in and of itself not a problem for us in terms of planning, we are going to be getting data out of this new monitoring, which I think is very helpful and responsive to concerns that have been raised by communities that are downwind of these major facilities. And so I'm hoping that, if anybody is listening today, or if they're not, that in the future we will be able to communicate that this is an area where perhaps an investment that's required by one part of the Clean Air Act turns out to be moving us in a direction that's very useful and really enabling us to respond effectively to concerns that are being raised by all of the groups that are particularly concerned about environmental justice considerations. And I think it's going to be useful to researchers and others as well.

BOARD MEMBER BALMES: So does that mean that we're monitoring for other pollutants in conjunction with SO_2?

CHAIRPERSON NICHOLS: These stations have other monitoring attached to them in many instances.

Yes. Go ahead, Karen.

AIR QUALITY DATA BRANCH CHIEF MAGLIANO: This is

Karen Magliano.

In the ports network, for example, in the South Coast, that's a comprehensive network that has multiple pollutants that are measured.

Around the refineries it's simply focused on SO_2 and then some hydrogen sulfide monitoring because of issues about odors. But Bay Area has said there's the possibility that those networks could be expanded if there was strong interest.

CHAIRPERSON NICHOLS: And once you've got the sites, other things are possible too.

BOARD MEMBER BALMES: Right.

CHAIRPERSON NICHOLS: So I think this is good stuff, just to let you know.

BOARD MEMBER BALMES: Yeah, I have to confess that I was on the Clean Air Scientific Advisory Committee panel that reviewed the SO_2 standard. And the first research I ever did with a air pollutant was on SO_2, and showed that even short exposures could lead to exacerbations of asthma. So I was really pleased that EPA finally came up with a standard that protects asthmatics. But I'm also glad to see that we basically don't have a problem here in California --

CHAIRPERSON NICHOLS: Yes, for once.

BOARD MEMBER BALMES: -- with regard to

enforcement.

CHAIRPERSON NICHOLS: Yes, Ms. Berg.

BOARD MEMBER BERG: It just occurred to me that, in reading -- or listening to the facilities that you listed, that these facilities are going to fall under the requirement under AB 32 to do some review of their pollutants and come up with scenarios that they might be able to reduce those pollutants. And I was just wondering if additional requirements -- if we go back and look at what they're required to do under that requirement, that we are trying to keep things homogenized as best as possible and not keep them in silos. So it would seem to me that SO_2 would certainly fall under that requirement. And so whatever modeling they're doing there, does it apply to this, or will this modeling apply to that? So that we're not asking them to do an entire different study that is going to be duplicative cost -- it'll double cost. And so have we taken a look at things like that?

BOARD MEMBER BALMES: That's the industrial audit, I think you're referring to.

CHAIRPERSON NICHOLS: That's what I was wondering.

DEPUTY EXECUTIVE OFFICER FLETCHER: I think it's the industrial audit measure that you're looking at. And the modeling that -- they're not really doing modeling in

this context where they're estimating the fence line or near-term concentrations of SO_2. In the industrial audits measure what they're doing is going through and looking at the emissions of various units within the facility, whether it's a refinery or cement plant, and looking at ways -- you know, first of all what is the energy efficiency of the individual units within there? And then looking at the technology that could be applied to reduce that both from a greenhouse gas and a criteria pollutant -- criteria and toxic pollutant.

So I don't think there's a conflict here in terms of what's required.

CHAIRPERSON NICHOLS: But there is a connection. And the question is --

DEPUTY EXECUTIVE OFFICER FLETCHER: There's a connection but not a requirement.

CHAIRPERSON NICHOLS: -- is there some potential --

BOARD MEMBER BALMES: Synergy.

BOARD MEMBER BERG: I just think we need to be mindful as the same people are popping up, you know, because they're the ones that are going to be the larger emitters. And I just think we need to be mindful how can we look at our roles to be able to get the most bang for their buck. And I just would appreciate if staff could

keep that in mind.

CHAIRPERSON NICHOLS: No, I think that's a good point, especially when you're even just about multiple communications coming from us; you know, first it's this and then it's that. I can -- from the perspective of the facility owner, it's going to look like something uncoordinated and potentially more burdensome than it has to be.

So I guess the question, or maybe direction to staff, would be to take a look at how we're rolling out these two items and see if there's some potential to coordinate.

DEPUTY EXECUTIVE OFFICER TERRY: Maybe just one quick comment.

The only requirement really imposed on California that's new as a result of this process is the requirement to do the air quality modeling specific to SO_2 for those 34 facilities. In this particular case, the air districts will be doing the modeling or else ARB. So there's pretty limited impact on the facilities themselves.

BOARD MEMBER BERG: Thank you for that clarification.

CHAIRPERSON NICHOLS: Okay. Good.

All right. If there's nothing more on this item, thank you very much for the report.

And we will move on to our last item, which is also a regulatory item, which is proposed amendments to the Oceangoing Vessel Clean Fuel Regulation. This regulation has been in the process of being implemented since July 2009 and requires ships within 24 nautical miles of the California coastline to use cleaner burning fuels.

The amendments that we're considering today were developed with information that was learned during the first year and a half of implementation. As many of you will remember -- well, when this regulation was originally adopted in 2008, the Navy raised a concern at the time about the impacts of changes in vessel routing that might occur as a result of the regulation. And at the time the staff was directed to monitor the situation and report back to the Board if ships posed a potential problem for the operations at the sea range.

Unfortunately, it did. And the staff has worked closely with the Navy and other stakeholders to develop amendments that address the Navy's concerns, as well as preserving the essential public health and air quality benefits from this regulation, some of which you already heard about just a minute ago when we were talking about our progress on SO_2.

So the situation that we're facing is that there

has been a change in vessel routing that's resulted in the significant increase in the number of ships that are making their way through the Navy's Point Mugu Sea Range in southern California. And we're now in the process of trying to address that.

For your information, I thought it would be useful to ask the Navy to come join us today and give us a short presentation about the sea range prior to the staff presentation of the proposed amendments.

We have with us I, believe - I'm looking out here - Capt. Sinofsky, who's here to make this presentation. And I want to thank him for coming today.

And I'll ask Mr. Goldstene first to just introduce the item.

EXECUTIVE OFFICER GOLDSTENE: Thank you, Chairman Nichols.

As with any regulation adopted by the Board, ARB staff monitor implementation. If information becomes available to indicate that amendments are needed, we work with stakeholders to develop amendments for your consideration. This is the case for the Oceangoing Vessel Clean Fuel regulation, as Chairman Nichols just indicated.

Amendments are needed to help address the change in channel traffic patterns that have occurred -- in vessel traffic patterns that have occurred in southern

California and that are creating the potential for vessels to interfere with Navy operations in the Point Mugu Sea Range.

ARB staff worked closely with the U.S. Navy, U.S. Coast Guard, and other stakeholders on this issue. Based on the work, staff will propose amendments today that we believe will reduce the potential for vessels to interfere with Navy operations in the sea range and will help ensure a successful transition to low sulfur fuels by aligning the implementation dates of the regulation more closely with recently adopted federal requirements.

These amendments retain the health protective and air quality benefits originally anticipated from the regulation.

I'll now ask Bonnie Soriano of the Stationary Source Division to present the staff's proposal.

Bonnie.

(Thereupon an overhead presentation was presented as follows.)

STAFF AIR POLLUTION SPECIALIST SORIANO: Thank you, Mr. Goldstene.

Good morning, Madam Chairman and members of the Board.

Today we are proposing for your consideration amendments to the Oceangoing Vessel Clean Fuel regulation.

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STAFF AIR POLLUTION SPECIALIST SORIANO: I have a brief presentation that will provide a background on the regulation, describe the amendments we believe are warranted, discuss the impacts from those amendments, propose one 15-day change, and then provide conclusions and recommendation.

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STAFF AIR POLLUTION SPECIALIST SORIANO: Now a brief overview of the regulation itself.

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STAFF AIR POLLUTION SPECIALIST SORIANO: The Oceangoing Vessel Clean Fuel Rule was approved by the Board in 2008 and began implementation in July 2009, and that's about two years ago. It requires ships to use cleaner marine distillate fuels instead of the dirtier residual fuel that they typically use. Ships are required to use the cleaner fuels within a clean fuel zone that is approximately 24 nautical miles off the California coastline. And that is shown in this figure on the slide as the lighter blue region along the California coastline.

The fuel requirements are implemented in two phases having progressively lower fuel sulfur limits.

Phase 1, which began July 2009, requires the use of either marine gas oil or marine diesel oil. The marine

diesel oil is capped at .5 percent sulfur.

Both of these are distillate fuels. We are finding that on average the marine distillate fuels that the ships are using to comply with this regulation average about .3 percent sulfur.

Phase 2 is scheduled to begin in January of next year, 2012, and establishes a fuel sulfur requirement of .1 percent.

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STAFF AIR POLLUTION SPECIALIST SORIANO: This regulation is a critical measure in our efforts to improve air quality and protect public health. It contributes over half of the reductions from new measures in the South Coast's 2014 PM2.5 attainment demonstration.

It is also a key measure in the ports of Los Angeles and Long Beach clean air plan and reduces the public's exposure to diesel PM from ships by over 80 percent.

Because it is a clean fuel requirement, the benefits of the regulation begin immediately upon implementation. And over the past two years, the use of cleaner fuels has reduced emissions of sulfur dioxide, which I'm going to short cut as SOx through the rest of my presentation, by 73 tons per day; PM, which is particulate matter, by 8 tons per day; and NOx by 8 tons per day.

This translates to about 6,000 tons of both PM and NOx and 50,000 tons of SOx reduced over the last two years.

While about 90 percent of the emissions benefits are realized with the Phase 1 fuels, the Phase 2 fuel requirement will also provide additional benefits of about 2 tons per day PM and 17 tons per day of SOx.

When you approved this regulation, it was the first comprehensive ship fuel requirement in the world. And as I'll discuss a little later, since that time federal and international fuel requirements have been adopted.

California's regulation is a critical bridge to these federal requirements that will be equivalent to our Phase 2 0.1 percent requirement in 2015.

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STAFF AIR POLLUTION SPECIALIST SORIANO: Now I'll discuss the proposed amendments.

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STAFF AIR POLLUTION SPECIALIST SORIANO: Overall, the implementation of this regulation has been going very well. We estimate that there have been over 19,000 ship visits since July of 2009, and we are seeing well over a 95 percent compliance rate. However, we have encountered some challenges that warrant the need for amendments.

One of the things that has happened is that the traffic patterns have changed in southern California. This is because many vessel operators have elected to use a route outside the regulatory zone where they're not required to use the cleaner fuel. This has resulted in a significant increase in traffic through the Navy's Point Mugu Sea Range and according to the Navy has increased the potential for vessels to interfere with naval testing and operations.

There have also been some operational challenges that have resulted in a small number of temporary loss of propulsion incidents, mainly related to the lower viscosity of the clean fuel.

And, last, as I mentioned before, there are new federal and international requirements. While this is not necessarily a challenge, it does present an opportunity to better align the California program with federal requirements, which we think will facilitate successful implementation of both programs.

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STAFF AIR POLLUTION SPECIALIST SORIANO: Over the past two years, we have worked closely with the maritime industry, the Navy, the U.S. Coast Guard, and local districts in implementing the regulation and in developing the proposed amendments to address the issues that I have

described.

Our objectives in proposing the amendments are:

To minimize the impacts on the Point Mugu Sea range;

To facilitate a more successful transition to the cleaner .1 percent sulfur fuel; and

To make other minor adjustments to the regulation that we believe will help with implementation.

In the next few slides, I will describe the amendments we are proposing and our rationale.

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STAFF AIR POLLUTION SPECIALIST SORIANO: First, we think that it is very important to do what we can to minimize the potential impacts to the Navy's Point Mugu Sea Range from the increased vessel traffic. To do this, we are proposing to expand the clean fuel zone in southern California. By expanding the clean fuel zone, we eliminate the cost advantage of using routes through the Point Mugu Sea Range. If this is done, we believe that the vessels will return to the historical routes they used before the regulation was implemented, lessening the potential for vessels to interfere with the military operations.

In addition, because the vessels will be using the cleaner fuel, the emission reductions originally

anticipated in this region will be regained.

And now I'll provide you with some background on the need for this amendment.

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STAFF AIR POLLUTION SPECIALIST SORIANO: In this slide, I will walk you through the changes in traffic Patterns in southern California. So I'm starting here with the region, which is about from the tip of Santa Barbara to the ports of Los Angeles and Long Beach. The Channel Islands are shown. And the large overwater areas shown in bright blue are the Navy's Point Mugu Sea Range.

The Santa Barbara Channel route is now shown as the dark blue double line. This route is a long-standing traffic separation scheme that extends the length of the Santa Barbara Channel and is listed on NOAA and nautical charts. It is the only International Maritime Organization-approved routing measure in this area. And it was established to reduce the risk of collisions by separating arriving and departing traffic.

This route is also typically the shortest route for both traffic arriving from Asia on the Great Circle route and traffic to and from northern California.

As shown in the gray area, the current clean fuel rule extends out to about 24 nautical miles off the coastline. Vessels operating in this zone must use the

cleaner fuels.

After implementation of the rule, many shippers have increasingly chosen to transit through the Point Mugu Sea Range outside the clean fuel zone. We have depicted the transit through the sea range and called it the outer route. It is the red line on the southwest side of the islands.

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STAFF AIR POLLUTION SPECIALIST SORIANO: As shown in this figure, since implementation of the regulation began there's been a steady increase in the number of vessels that have elected to transit through the Point Mugu Sea Range.

This chart shows the change in the percentage of vessels to the ports of L.A. and Long Beach that transit through the sea range. As you can see, historically about seven percent of the traffic used to transit through the sea range. That has now increased to about 50 to 60 percent of all port vessel visits.

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STAFF AIR POLLUTION SPECIALIST SORIANO: We believe the changes in vessel routing are primarily driven by the fuel cost difference between the two routes. The cost of the channel route is about $3,000 higher since the more expensive fuel is required for that entire portion.

As you will hear in their presentation, the U.S. Navy has raised concerns about the higher number of vessels transiting in the sea range, as it has increased the potential for vessels to impact exercises and operations that take place in the sea range.

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STAFF AIR POLLUTION SPECIALIST SORIANO: In this map, I will describe the proposed amendments to the clean fuel zone. So we are starting here at the same place we left off in the last map slide. And this shows the current clean fuel zone in gray, the channel route in the double line in blue, and the outer route in red.

We propose to expand the zone out past the Channel Islands in southern California. The expanded zone is consistent with the contiguous zone, which is a well realized zone on nautical charts.

We also propose to exclude a small area of the contiguous zone from the clean fuel requirement. We have referred to this area as a window.

The purpose of the window is to equalize the distance that the clean fuel is required for the two routes and correspondingly equalize the fuel costs.

With these changes to the boundary in southern California, we believe vessel operators will return to the Santa Barbara Channel route and lessen the potential

impacts on the Point Mugu Sea Range.

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STAFF AIR POLLUTION SPECIALIST SORIANO: The second amendment I will discuss is a proposal to extend the Phase 1 fuel requirement by two years and to begin Phase 2 in 2014. While we are fully committed to reaching the Phase 2 limit of .1 percent sulfur and believe it to be technologically and operationally feasible and cost effective, we do think that there are valid reasons to adjust the timing for the implementation of the Phase 2 requirements.

We believe that taking a little longer will help facilitate a successful transition to the cleaner 0.1 percent fuel and still allow us to meet our SIP commitments. It will simplify integration of state and federal requirements and provide additional time to address operational and fuel issues.

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STAFF AIR POLLUTION SPECIALIST SORIANO: Since the adoption of the OGV rule, as I mentioned before, federal and international standards have been established. And just to give you some idea of these standards, in March of 2010, a North American Emission Control Area - or I'll call this the ECA - was approved. The ECA requires 1 percent sulfur fuel, and it can be either heavy fuel or

distillate, beginning in August 2012 and then a 0.1 percent sulfur fuel beginning in January of 2015. The ECA zone is about 200 nautical miles from the U.S. And Canadian coastline.

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STAFF AIR POLLUTION SPECIALIST SORIANO: Moving the Phase 1 out by two years will more closely align our Phase 2 implementation date with the ECA Phase 2 requirement, and also it will help to avoid having vessel operators manage different federal and state fuel requirement changes in 2012.

The extension will also allow time for coordination with the U.S. EPA, U.S. Coast Guard, and others during the transition to the 0.1 percent sulfur fuel requirement.

The extension will not impact the significant benefits that are achieved with the Phase 1 fuels. And as a reminder, over 90 percent of the emission reductions from the regulation are realized with the Phase 1 fuels.

The two-year extension is also consistent with our 2014 SIP commitment for South Coast.

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STAFF AIR POLLUTION SPECIALIST SORIANO: The proposed Phase 2 extension also provides additional time to address operational issues such as temporary loss of

propulsions. And I'll call those LOPs. With about 19,000 successful vessel visits since the regulation began, the Coast Guard has reported that a small number of vessels - and this is about 2 percent of all vessel visits or about 38 vessels - have experienced loss of propulsion incidents related to the use of distillate fuel.

During the last two years, ARB has worked closely with the Coast Guard, Harbor Safety committees, the Office of Spill Prevention to address these operational issues.

Under contract to the Air Resources Board, the California Maritime Academy investigated the LOPs and identified primary areas of concern. CMA identified that an area of concern was low fuel pressure related to the low viscosity of the distillate fuel.

The extension in Phase 1 provides additional time to investigate causes and determine solutions for the loss of propulsion incidents prior to implementing more restrictive fuel requirements.

The extension also provides more flexibility to find fuels with higher viscosity levels since Phase 1 is less restrictive, and provides more time for recent viscosity related enhancements to the fuel specifications to more fully reach the marine fuels market.

And that leads me on to our third objective.

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STAFF AIR POLLUTION SPECIALIST SORIANO: To further assist implementation, we are also proposing other minor amendments, such as the incorporation of a revised fuel standard that has enhanced viscosity and lubricity specs, that I just mentioned in the last side, and an updated nautical chart.

We are also proposing changes to the noncompliance fee provision, which I'll discuss more in the next slide.

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STAFF AIR POLLUTION SPECIALIST SORIANO: The noncompliance fee provision allows vessel operators to pay a fee instead of direct compliance. And it is limited to very special circumstances that are beyond the master's reasonable control, such as unplanned redirection at sea or purchase of defective fuel. This provision is not a fine or a violation, and it has only been used five times since the rule began. It also requires ARB approval prior to use.

We are proposing to restructure the fees to encourage purchase of a compliant fuel on arrival to California by having the fee in that situation.

We propose to retain the same fee for a single port visit, but adjust the fee structure for multiple port visits.

Staff believes that the proposal is a more reasonable fee structure. And even with these proposed amendments, all noncompliance fees are at least one and a half times higher than the cost of direct compliance would be if the vessels were using the fuel.

We do not think that these changes will result in increased use of this provision, as we are not proposing any changes to the criteria that specify when the noncompliance fee can be used. And these criteria are very restrictive.

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STAFF AIR POLLUTION SPECIALIST SORIANO: So now I'll go over the impacts of the proposed amendments.

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STAFF AIR POLLUTION SPECIALIST SORIANO: The charts on this slide show the projected PM on top and the SOx emissions on the bottom until 2015. The base line with no rule is shown in green, the current regulation is shown in blue, and the proposed amendments in red.

As you can see from the charts, the proposal retains the emission reductions projected for the current rule for both PM and SOx, and emissions continue to decline in subsequent years.

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STAFF AIR POLLUTION SPECIALIST SORIANO: We also

saw in the previous slide the protected emission reductions are greater statewide with the proposed amendments than with the current rule. However, due to the Phase 1 extension, the benefits are slightly lower in 2012 and 2013. In that two-year period, the emissions will still continue to decline, just not as quickly. And the remaining emissions are far lower than originally anticipated, in part due to the recession.

Staff has also evaluated the potential impacts to whales in the southern California region due to the anticipated increase in vessel traffic using the channel route. We found that the impact will be similar to what it was before the regulation where the vessels primarily used the channel route.

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STAFF AIR POLLUTION SPECIALIST SORIANO: The total estimated costs of the proposed amendments are $10 million per year in 2012 and 2013 and $47 million per year in 2014.

The proposed amendments do provide cost savings compared to the original rulemaking primarily due to the extension of the Phase 1.

The cost effectiveness of the proposed amendments is about $16 per pound of diesel PM reduced, which compares favorably to many other regulations adopted by

the Board.

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STAFF AIR POLLUTION SPECIALIST SORIANO: I will now cover our proposed 15-day change.

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STAFF AIR POLLUTION SPECIALIST SORIANO: We have identified one 15-day change that will help further integrate our regulation with the ECA. To align California's Phase 1 with the ECA Phase 1 sulfur requirement, we propose to include a 1 percent fuel sulfur limit for our Phase 1 marine gas oil. We propose that this requirement begins August 1, 2012, to coincide with the ECA Phase 1 implementation date.

We do not expect this change to impact the regulated industry since Phase 1 complaint marine gas oil averages .3 percent, well below the one percent proposed limit. And inspection records show that 98 percent of the Phase 1 compliant fuels sampled by our enforcement staff are below 1 percent sulfur.

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STAFF AIR POLLUTION SPECIALIST SORIANO: In conclusion, we believe the proposed amendments will assist in the successful transition to 0.1 percent sulfur fuel. The amendments will lessen the potential for impacts on the Point Mugu Sea Range by removing the economic

advantage that drives the route changes in southern California.

The amendments will also provide the benefits of additional time to address operational issues that have been encountered and better integrate state and federal programs.

The amendments before you today also continue to fulfill our 2014 SIP obligation and are cost effective.

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STAFF AIR POLLUTION SPECIALIST SORIANO: We recommend that the Board adopt the proposed amendments with the suggested 15-day change.

We also recommend that you direct staff to work with the Navy to monitor vessel traffic trends through the Point Mugu Sea Range, and also to continue to work with the U.S. Coast guard and the maritime industry to monitor, investigate, and evaluate any fuel-related issues.

This ends our presentation. And I would now like to thank you for your attention.

And now Richard Corey will introduce the U.S. Navy's personal.

STATIONARY SOURCE DIVISION CHIEF COREY: Yes, now we're asking Tony Parisi, Randy Friedman, and Captain Cudnohufskyto join us for a presentation on the Point Mugu Sea Range.

And it will be Captain Sinofsky with the Naval Air Systems Command that will give the presentation.

CHAIRPERSON NICHOLS: Thank you. Welcome.

CAPTAIN CUDNOHUFSKY: Good afternoon. How are you?

CHAIRPERSON NICHOLS: Good afternoon.

CAPTAIN CUDNOHUFSKY: So what I'll be doing this afternoon is just talking about our mission as NAWCWD as well as the sea range and how this is impacting our operations.

(Thereupon an overhead presentation was presented as follows.)

CAPTAIN CUDNOHUFSKY: So the first slide shows an overview of the Point Mugu Sea Range. And it's part of the NAVAIR West Coast ranges systems, a very integral part. The connecting part is what we call the IR 200 corridor that we can activate at different times to support missions when required.

The sea range provides safe, operational, and realistic environment for us to test and training -- testing and training for mainly naval air systems, but we also cater to all weapon systems for DOD and our allied counties as well.

Our core mission is mainly testing, training, and experimentation associated with primarily air warfare

systems.

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CAPTAIN CUDNOHUFSKY: So as I said, it's primarily providing a realistic open-air-range environment. It's 36,000 square miles of sea range. And it can be expanded as required to accommodate additional testing. For example, the Missile Defense Association when we work with some of their programs requires a much larger range. So we'll expand the range to accommodate those type of tests.

We have operations and range control complexes that support the operation of the sea range and we have extensive instrumentation throughout the sea range. The TSPI is time, space, and position instrumentations.

We have sophisticated data processing and display systems, as well as air and sea targets that we can incorporate throughout the range.

Range safety and security and environmental support is extensive throughout the range complex systems, and we have a whole host of support aircraft for our missions.

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CAPTAIN CUDNOHUFSKY: We're the nation's largest and most capable instrumented sea range. We're ideally suited for our missions that we perform out there to

provide the nation with its air and sea weapons to defend our nation.

It's ideal location where we are supported by the natural features such as the islands, San Nicolas Island, Santa Rosa Island, the Laguna Peak where our instrumentation is elevated well above the sea level, over a thousand feet, and look well into the range.

Supports a broad array of testing and training scenarios. And I'll talk a little bit more about that later. But, again, primarily we're supporting the research, development, acquisition, testing and evaluation of our weapons, our nation's weapons.

Not only do we support and test and train our Navy's weapon systems, but also all of DOD - Air Force, Army, Marine Corps as well as other international countries that are our allies.

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CAPTAIN CUDNOHUFSKY: This cartoon provides you a little bit of insight into the type of -- a typical type of a mission we would do out on the sea range. We'd have the flight test vehicle performing out in the range and we'd have multiple instrumentation that would track it.

And the TM is telemetry. That provides us the health and welfare and safety aspects of that vehicle. And that's all sent back to our range control back at

Point Mugu and then San Nicolas Island. And then through fiber optics and microwave connections, we're completely integrated with all of the instrumentation and sensors.

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CAPTAIN CUDNOHUFSKY: This depicts a little bit of a typical type of a hazard pattern that would be associated with a test or a mission that we would do out there. So different colors would indicate different type of tests that we would do. So when we're testing a particular air vehicle perhaps, launching it from Point Mugu, there would be an associated hazard pattern that would be associated with that weapon. So before the launch of that weapon, we'd clear that air zone and the sea zone, make sure it's completely clear of ships, nonparticipants, and ensure that it would be cleared for however long the window that our mission would take place.

So, you know, a ship typically moves 12 to 15 knots. We'd go out -- if it was a two-hour window, we'd go out 30 miles beyond the hazard pattern and make sure that no ship would be able to move within that pattern as we had cleared it.

So some of them are smaller hazard patterns. Some are quite large and extensive.

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CAPTAIN CUDNOHUFSKY: This is a depiction of the

type of operations that we would do it out on the sea range. We'd typically have about 17,000 events per years.

The red is training events. The blue, operations. And green is RTD&E, research, test, development, and experimentation. And the yellow would be maintenance, maintenance of our sea range boats or aircraft that we'd need to do out on the sea range.

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CAPTAIN CUDNOHUFSKY: Of course with any type of an operation we'd do out there, safety is paramount, and we're very serious about that and have a very good safety record.

And it's very -- we take great pains to make sure that the evolution is safe. And part of that is clearing that range with our aircraft, making sure no one -- no nonparticipants are within there. And if we do happen to get what we call an interloper, somebody that doesn't belong in there, we'll cease all operations until we can clear the range and make sure we have a safe environment to conduct our tests.

And we have extensive instrumentation to be able to help us do that and monitor what's out there and what should and should not be out there.

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CAPTAIN CUDNOHUFSKY: So this is very similar to

the chart you had seen in the previous presentation, with the channel in green. And then what we've been observing with the red alternate shipping route that we've seen that interferes with the operations that the Navy does out on the sea range. As the ships divert out of the channel, they transit across the sea range, which then impacts our operations, causing either delays or cancellations in our operations.

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CAPTAIN CUDNOHUFSKY: And to that extent, this next chart shows, again very similar to the chart you'd seen on the previous presentation, what we've observed on that behavior. So on the far left what we are seeing is one inbound and one outbound ship per day. And since that time of 1 July in 08 until present it is now up to seven to seven and a half times what we had seen historically. So a significant increase in shipping across the sea range.

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CAPTAIN CUDNOHUFSKY: To help mitigate some of this, we've done extensive coordination with the shipping industry through L.A. and Long Beach, a marine exchange from our Ops conductors.

Through our surveillance of the sea range, we have redirected the ships that were in the area. And that

typically results in quite a delay into the mission. Ships moving at 12 knots, it takes sometime to transit across the sea range. They can't just turn around or, you know, accelerate there. So typically it's an hour or several hours of delay into a mission, which represents a significant cost.

And we tried to minimize operational impacts. But to that extent there's only so much we could do to mitigate that.

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CAPTAIN CUDNOHUFSKY: And our concerns obviously in the future, what we see if we're unable to get the shipping behavior back into the channels, we're going to see increased transits through the sea range, which obviously have impacts into our mission.

As hopefully our economy recovers, I think it will be more incentive perhaps if we don't get this regulation in place, that these ships will continue to divert the channel.

Some of the delays and cancellations will be inevitable, will increase costs to the programs. As the economy and our budgets are all shrinking, that's a significant impact into our programs and our ability to bring these needed weapons online.

And the perhaps intangible costs are the training

events that are taking place out there for our military are unable to be completed. So we deploy our military without the really benefit of the needed training that would have been accomplished, if they're impacted and are unable to do their training due to ships through the sea range.

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CAPTAIN CUDNOHUFSKY: And, in summary, again Point Mugu Sea Range and the missions that we complete out there and the testing and evaluation, support that acquisition programs for the weapon systems that we bring online, it's critical that we are able to conduct those tests and evaluations and training on time and when needed.

As an example, the Joint Strike Fighter Program operates at a burn rate of about $30 million a day. So every day that they're unable to collect the needed data to continue to progress the program, it essentially will cost the program $30 million. Obviously not every program is such a substantial program. But all programs have a limited budget in order to operate and complete their programs and bring these weapons online. So it is a significant impact.

Increase in ship traffic through the sea range is impacting our ability to test and train. We've been

working with the shipping industry and there's significant coordination that's been taking place to try and mitigate these impacts. But as you can see, the data says that it still is an impact for us.

And as the economy improves, the shipping industry will probably -- we'll see more and more traffic. And if we're unable to keep them in the channel, the results will be more impact into our mission.

So our recommendation is to approve the modification to the low sulfur regulation.

CHAIRPERSON NICHOLS: Thank you very much.

CAPTAIN CUDNOHUFSKY: More than happy to take my questions you might have.

CHAIRPERSON NICHOLS: Thanks.

I want to express my appreciation. I understand this has taken a lot of time and effort on your part, on the Navy's part, as well as on our staff. And the fact that you were willing to work together with us to try to achieve our mutual objectives here is really much appreciated. I know that in the past sometimes we've seemed like the two agencies were just not able to get on the same page. And I really appreciate how hard you've worked to try to make sure that that can happen.

I know it was really tough for the staff to face the possibility of a loss of the emissions benefits from

this rule. And the fact that I think we've been able to design a way to do this that does not involve a sacrifice there is really terrific. It's a great outcome.

So I don't know if anybody has any questions now or we can just hear from the witnesses. If that's okay, we'll just go straight to the witnesses.

We do have a number of people who've signed up to testify.

And you're welcome to stay up here if you would like.

We'll start with Michael Villegas from Ventura County APCD and then Kathy Long and Jonathan Sharkey.

And we do have your written, Supervisor Long.

MR. VILLAGES: Chair Nichols, members of the Board. I'm Mike Villegas, Air Pollution Control Officer for Ventura County.

Ventura County APCD staff is pleased to support the California Air Resources Board staff proposed changes to the regulations for oceangoing vessel fuels. These proposed amendments will achieve nearly all the emission reductions that were envisioned when this rule was originally adopted in 2008.

The 83 percent reduction in toxic diesel particulates will provide a significant health benefit to Ventura County residents. Further, we will be achieving

reductions in sulfur dioxide and nitrogen oxides.

In addition, the proposed amendments will do away with the economic incentive for vessels to pass through the Navy's test range. And this should prevent disruption of the Navy's operations.

We've also reviewed the rationale for the delay in the Phase 2 sulfur standards. And we believe the delay is reasonable based on the fact it will better harmonize CARB's requirements with the ECA requirements. Also will give time for the development of additional fuels that will comply with the new ISO standards, which are going to address viscosity and lubricity for those engines, which should help with loss of power.

In addition, we reviewed the proposal to reduce the noncompliance fees. And we believe this proposal once again makes sense. These provisions have been used only five times in over 18,000 port visits. Further, there's is no cost advantage to using the noncompliance fees versus complying with the rules, so we believe it makes sense.

Lastly, I need to note that the Air Pollution Control board for Ventura County has submitted a letter of support for these regulations.

CHAIRPERSON NICHOLS: We have that.

MR. VILLEGAS: Thank you.

CHAIRPERSON NICHOLS: Thank you very much.

Supervisor Long.

SUPERVISOR LONG: Yes, good afternoon. And thank you, Madam Chair and Board members.

It is my pleasure to be here to speak to this and to certainly support the staff recommendation strongly on behalf of Ventura County. I thank the staff, applaud them for their efforts in working with the stakeholders. I believe we have a win-win recommendations with the amendments.

I'm here representing as Co-chair of the Regional Defense Partnership for the 21st Century, RDP-21. It's a community-based organization in Ventura County that has been around for over ten years supporting our naval base in Ventura County for the many assets, both the military strategic importance of the base, but also for the economic driver that the base is for all of us, and the environmental stewards that they are.

And so the RDP-21 represents both public and private. It has all ten cities in the county. It has other electeds, such as Senator Fran Pavley is very supportive, and our Congressmen, both Capps and Gallegly.

And certainly our goal is to provide and educate our community, engage them in understanding what the values of the base are. And as the base has been, and as

all bases in prior BRACs have been, threatened with closure for a variety of reason, the reason that we've been able to stand so strong with our base is the sea test range and the value that it brings both again for the military importance but also the economic engine that it is for all of our county.

We have more than 19,000 personnel, military and civilian, who are working at that base. So you can understand what the multiplier of that is to our local economy: Over 20,000 at least jobs and the multiplying benefit of $1.2 billion in goods and services, and the fact that it continues to be such an important part in bringing new business to the base. And that does occur with the test range.

RDP-21 is very supportive of the oceangoing vessel fuel rule. We certainly are supportive of everyone's goal to have clean air. And as I said at the beginning, this is a win-win to be able to carry this amendment through with the good work and the cooperation of the stakeholders to applaud that effort and to ask for a strong "yes" vote in support of this.

Thank you for your time and your work on this. We appreciate it. Thank you.

CHAIRPERSON NICHOLS: Well, thank you for coming.

Jonathan Sharkey, a council member from Port

Hueneme.

Welcome.

MR. SHARKEY: Yes, good afternoon, Madam Chair, members of the Board. I'm Jon Sharkey, Port Hueneme City Council, member of the Ventura County Air Quality Control Board, and a member of the Regional Defense Partnership.

And coming third in the group, it's all been said. But I would like to personally thank the staff here, who's done a marvelous job in solving a problem. Clearly the previous rule did not achieve its objectives. We believe this new rule will achieve the air quality objectives and will reduce the impacts on naval base, Ventura County, a large part of which sits in my city.

So thank you all.

CHAIRPERSON NICHOLS: Thanks for coming.

Henry Pak from Hanjin Shipping, followed by Martin Schlageter and Henry Hogo.

MR. PAK: Good afternoon, Chairwoman Nichols and all the Board members.

First of all, on behalf of our company, Hanjin Shipping Company, I'd like to thank you for allowing us to express our concern. And it's going to be very short.

We are not opposing to anything else but the implementation date of Phase 2. I understand that it's been pushed back to 2014 January from the initial starting

date of 2012 January. But we believe that -- or we feel that the implementation date should be conformed with the further requirement, which is 2015 January, which allows one more year -- or one additional year for carriers to prepare.

And in line with that, considering fuel suppliers comment and our company's research, there is no fuel supplier that can supply 0.1 percent sulfur distillate fuel in the region of eastern Asia and in America. In this regard, be advised that sufficient market surveys and technical verifications should take precedence in order to confirm the possibility and availability of the low sulfur fuel in those regions by 2014.

And, in addition, we need to ensure that there is sufficient infrastructure to supply low sulfur fuel without difficulties. And that is our concern, and I would appreciate it if you give second thought to that.

Thank you.

CHAIRPERSON NICHOLS: Thank you.

I'll ask staff to respond later.

Martin, Welcome.

MR. SCHLAGETER: Thank you so much. Martin Schlauggeter with the Coalition for Clean Air. Thank you, Madam Chair and Board members and staff for considering this today.

This ship fuel rule since it was initiated a few years ago is one of the most impactful things this Board has done in my view, in part because it has helped shape globally shipping practices. And there's been a lot of reference here to aligning with ECA standards. I don't want to lose sight of the fact that one of the main reasons we have this ECA adoption is because of what California's been doing under your leadership.

So I'm very much in support of the extension of this clean fuel zone and appreciate the fact that staff acted so promptly in addressing the issues of carriers avoiding that zone.

This change will, we expect, help bring into -- essentially bring into compliance and gain the emissions reductions that were expected from carriers who are now skirting this zone, interfering with the Navy, and unnecessarily polluting.

Certainly, we are not excited about a delay to 2014. We and the public health and environmental community are impatience. We like to see emissions reductions that are on the table and that we had hoped would be achieved immediately. What I -- sort of the lemonade that I'd like to suggest we make out of that delay, if we could, is to complete the rulemaking of which initial steps were taken back in 2008 on vessel speed

reduction. By setting speed limits on ships, we can control some of the unnecessary pollution, we can optimize fuel use and reduce greenhouse gas pollution and indeed hopefully minimize some of the whale strikes that was also referenced here today.

It's my belief that if we get to work on that - and this has been something languishing over the past couple of years - it's my belief with Board direction, if we can complete this rulemaking on vessel speed reduction, then at 2014 when carriers comply with fuel rules, they can also plan simultaneously for their timelines, their ship speeds, their logistics in that regard. And much was referenced by Ms. Berg in the last presentation, be giving a clear and concise package of instruction to carriers.

And I thank you so much. I encourage your action on that.

I have already submitted to the clerk a petition of more than 450 signatures that we've gathered over the past month out of interest in this speed limits issue.

So thank you so much.

CHAIRPERSON NICHOLS: Thank you.

All right. Henry Hogo, followed by Cooper Hanning and Diane Bailey.

MR. HOGO: Good afternoon, Chairman Nichols and members of the Board. I'm Henry Hogo, Assistant Deputy

Executive Officer of the South Coast Air Quality Management District.

I'm here to express the South Coast AQMD staff's support for the extension of the regulatory boundary beyond the current 24 nautical miles to ensure that oceangoing vessels use the cleanest fuel possible. And we would encourage you to adopt that today.

Relative to the delay in the use of .1 percent, we just want to express caution in this delay. We would want to encourage that marine vessel operators use the .1 percent as early as possible so we can understand some of the issues related to it and closely monitor it. But we don't want to see this delay go beyond 2014 because it is a critical element of our 2007 AQMP.

Thank you.

CHAIRPERSON NICHOLS: Thank you. I appreciate that. And it's just useful to observe that we've had examples in the past of at least one major shipper that introduced lower sulfur fuel long ahead of a requirement. So it is possible for that to happen or to be encouraged, and we should try to make that happen.

MR. HOGO: Thank you.

CHAIRPERSON NICHOLS: Okay. Mr. Hanning.

MR. HANNING: Good afternoon, Chairman Nichols and members of the Board. My name is Cooper Hanning and I

represent the Natural Resources Defense Council.

We thank the Air Resources Board for acting to reduce emissions from oceangoing vessels by expanding the clean fuel zone beyond the Channel Islands and for providing incentives for ship operators to bunker with clean fuel as soon as possible upon arrival at a California port.

We also encourage the Board to consider additional regulations such as vessel speed reduction, which can reduce pollution in our communities and protect residents' health while decreasing California's greenhouse gas emissions.

Oceangoing vessels account for a tremendous amount of toxic pollution in our state. In 2006 ships were estimated to contribute 18 percent of diesel particulate matter in California. Diesel particulate matter is associated with a growing list of adverse health outcomes, and these outcomes are most common in children and the elderly. The negative health impacts are concentrated in neighborhoods closest to the ports and these communities are disproportionately bearing the burden of pollution from oceangoing vessels.

This pollution can be considerably reduced via vessel speed reduction. The Board should promulgate a regulation to limit ship speeds to 12 knots within 40

nautical miles of shore for all ship traffic in California waters. Slower ship speeds will reduce harm to marine life, cut greenhouse gas emissions, and reduce toxic air pollution in California.

In 2009, Air Resources Board staff estimated emissions reductions for a 12 knot speed limit applied to all vessels within 40 nautical miles of shore. Such a regulation would decrease diesel particulate emissions by 5.2 tons per day. California would also see daily reductions of 40 tons of nitrogen oxides and 43 tons of sulfur oxide.

The Board should combat this pollution by preserving existing regulations and adopting further measures such as vessel speed reduction.

CHAIRPERSON NICHOLS: Thank you.

Ms. Bailey.

MS. BAILEY: Good afternoon, Chairwoman Nichols, members of the Board, and staff. My name is Diane Bailey. I'm a senior scientist with the Natural Resources Defense Council. And as my colleague Cooper noted, we're here today in very strong support of the clean shipping fuel regulation and particularly the amendment to extend the clean fuel zone.

As you know, NRDC has been to court with you to help defend these very important regulations several

times. And we're happy to say that the courts resoundingly agree that California has the right to protect its coastal residents from the major health hazards associated with oceangoing vessels and the toxics laid in bunker fuel that has been used in the past.

California's clean fuel zone for international ships is one of the cornerstones of statewide emission reductions from this shipping sector, and it's really an important step to curb the pollution that comes into our state with the shipping to our ports, our rail yards, our distribution centers. This was really one of the biggest steps in reducing premature deaths from exposure to the pollution. And so we applaud the effort to extend the clean fuel zone and stem the 50 percent or so of ships that were evading this requirement in the past entering the ports of L.A. and Long Beach.

I want to note that we do have some concerns over the proposed amendments. The tier delay of course does carry somewhat of a penalty in terms of lost emission reductions and health benefits. And I don't want to exaggerate that, but I think that there are ways to make up for it, as my colleague Martin offered that there are ways to make lemonade today. And I really encourage you to look at other measures. As Martin noted, the vessel speed reduction measure has really languished. This is a

measure that can deliver tremendous environmental benefits from significant greenhouse gas reductions to marine mammal and wildlife protections, avoiding whale strikes and such. And I encourage this Board to take up that measure and really get it going.

We look forward to working with staff on further implementation of the clean shipping fuel zone as well as vessel speed reduction.

Thank you very much.

CHAIRPERSON NICHOLS: Thank you.

Randall Friedman, did you wish to testify again?

And Dan Krokosky and Bonnie Holmes-Gen.

MR. FRIEDMAN: Madam Chairman and Board members. Randall Friedman on behalf of the Navy Region Southwest.

The Navy's long-standing position has been that shipping regulation in the Santa Barbara Channel would move ships into the sea range and threaten its mission capability.

Today we are supportive of your staff's recommendation to amend this rule and take action to protect the Point Mugu Sea Range, as you indicated in the final statement of reasons you would do in the initial regulation.

We ask for ARB's continued commitment to work with all stakeholders, for example, the ports of Los

Angeles and Long Beach, to take all feasible measures to further support the return of shipping to the Santa Barbara Channel.

Finally, just a quick comment in response to the vessel speed reduction. I would just strongly urge you that in any consideration of this, please remember that if you only do this in the Santa Barbara Channel, we'll be right back here with the same problem. Anything to do with regulation of shipping needs to be done globally and consistently and take full accounting of the economics of shipping, the time, and the value; and needs to not create any sort of incentive that would make a transit through our sea range more attractive than staying in the Santa Barbara Channel where we all believe they belong.

Thank you. And again thanks to your staff for all the work they've done.

CHAIRPERSON NICHOLS: Thank you. You could have said, "I told you so."

(Laughter.)

EMISSIONS ASSESSMENT BRANCH CHIEF DONOHOUE: He has said that to us.

CHAIRPERSON NICHOLS: It was very nice.

(Laughter.)

MR. FRIEDMAN: I thought that was privileged.

CHAIRPERSON NICHOLS: It was appreciated.

All right.

MR. KROKOSKY: Good afternoon. I'm Dan Krokosky from Chevron Shipping. I'm the global bunker fuel and efficiency manager for the fleet.

Chevron Shipping has a wide variety of ships that are operating in and out of the zone on utra-low sulfur diesel. We've been doing this in order to develop the lubricants and technical expertise in order to be running on this fuel.

We're in favor of all of the changes you're going to make and we've been in support of the fuel change for the entire time.

The one comment we'd like to add is to move this change from 2014 out to 2015. One of the reasons is for practicality of using this sort of three-fuel scheme, which is really practically hard to deal with both in and out of the zone.

It's also unlikely that anybody's going to sell this 1 percent fuel. So that -- we'd also like you guys to take a strong look at this idea of viscosity of fuel. This is a very important safety aspect and ones that not all shipping companies have the expertise that we do in order to ensure they have the right viscosity. This could lead to a lot of problems with reliability of the ship, especially when you're maneuvering the ship. One of the

big dangers is the ship will not start. And of course the starting and stopping of the ship is what gives the ship its brakes. So again we'd really like to see a good look at this viscosity issue.

The other comment is, to overcome some of the shortfall in that one year is -- use this idea of virtual arrival, where you actually don't let any of the ships in to wait around the port. We found this to be very effective in just our own energy efficiency program. And by actually timing the ship's arrival all in so that the berths are open, you can save a lot of energy and fuel on that.

So please take these comments under consideration. Thanks again.

CHAIRPERSON NICHOLS: Thank you.

Just one question before you leave.

BOARD MEMBER D'ADAMO: Can you explain what you are looking for in viscosity of fuels. Are you saying that this additional time will give you the ability to look into that, or is there something more that you think that staff needs to do on this?

MR. KROKOSKY: I think you have an opportunity to set a viscosity. You set the sulfur level. You could also set a viscosity -- a safe viscosity level.

We use -- you know, I like 2.8 is a good

viscosity. Anything below that, you know, it's out of my comfort range. And I think by setting this standard, you could, you know, do a lot to ensure the safety of the ships themselves. Because not everybody -- you know, whatever limit you set or don't set, they will use it anyway, right?

BOARD MEMBER D'ADAMO: Thank you.

CHAIRPERSON NICHOLS: Okay. Bonnie Holmes-Gen.

MS. HOLMES-GEN: Good afternoon, Madam Chair, Board members. Bonnie Holmes-Gen with the American Lung Association in California.

And the American Lung Association strongly supported this oceangoing vessel regulation when it was first adopted. We appreciate your hard work on this. We believe this regulation is extremely important to address the public health impacts from exposure to diesel ship emissions. And we're very pleased with the success that has been achieved to date, and we appreciate that 90 percent of the emission reductions have been achieved.

And we wanted to again thank you for the work that you've done in coordinating with the Navy and the Coast Guard and achieving some consensus and moving forward.

Three quick points. That we strongly support the proposal for the extended fuel zone -- clean fuel zone to

regain lost emission reductions. And I appreciate the presentation. It's made extremely clear how important that is. So that's a very positive step forward.

And as with some of our colleagues with Coalition for Clean Air and NRDC, we are strongly supportive of implementing the .1 percent standard as soon as possible -- the .1 percent sulfur.

And in light of the proposed delay, we would encourage the Air Board to do everything possible to work with the Coast Guard to address these loss of power issues as soon as possible to make sure we can get back on track.

We do agree with the proposal to move ahead quickly with the vessel speed reduction regulation. And I think that is another very positive step we can take to move forward, because it does look like there are significant benefits from that regulation.

And I appreciate you, Madam Chair, raising again that the vessels certainly comply early. And we would certainly like to work with you and do everything possible to promote early compliance with the .1 percent sulfur standard to get these early health benefits. So I think that was also a very important suggestion, and we would like to look at ways we can try to encourage that early compliance to move ahead.

Thank you again for your hard work. And this is

a critical part of the Diesel Risk Reduction Program.

CHAIRPERSON NICHOLS: Thank you.

That concludes the list of witnesses that I have. And so I think we can close the record at this point. Just remind people that the record will be reopened when we issue a 15-day notice of public availability. And at that time we will be again accepting comments. But in between there won't be any comments after this hearing date. And when the record is reopened, then there'll be an opportunity for more comments on the proposed changes that will be addressed in the final statement of reasons.

Before we move to a vote on this item, I do just really want to say how proud I am that the staff has been able to successfully navigate, if I may, a very, very difficult issue here. I understand that our friends in the environmental and public health community do not lightly come to support this kind of a change. And I really appreciate it, because they are tough critics and I think they have realized that we've actually done a pretty good job here of making, as somebody said, lemonade out of lemons.

But I also -- I do want to ask the staff to just briefly address a couple of the points that we've heard more than one time. One is the question of whether the fuel will be available on the time frame that we're now

projecting. Another is the question of whether we're looking at this issue of vessel speed reduction in a serious way and if there's a plan to bring that forward.

Also, I know you are looking at the fuel viscosity issue. But maybe you'd like to report a little bit more on where that's at, what kind of work is going on.

And then, finally, on the last point that was raised by Mr. Krokosky, this issue about vessels waiting for berths and running their engines offshore. I know that's been addressed in some ports as a -- I mean it's like the air traffic control, a scheduling issue was an important issue. And I don't know that we have any jurisdiction on it. But I'd be interested to hear if there's anything going on or anything that we could do.

So I'm not quite sure who would like to address these, but --

EMISSIONS ASSESSMENT BRANCH CHIEF DONOHOUE: Let me kind of -- this is Dan Donohoue. Let me kind of orchestrate that.

On the virtual arrival, Peggy, could you kind of talk to that at least as far as that is part of the T6 goods movement area that we can look at. We've not been involved in it, but that's an area that there probably are opportunities that would fall into the work that we're

doing on the overall freight transportation thing.

TECHNICAL ANALYSIS SECTION MANAGER TARICCO: Yes, as part of the measure in our climate change plan to try to improve the efficiency of freight operations in the state, we will be looking at a broad range of measures to see, you know, how to implement them and working with, you know, the ports and the maritime industry to see which ones make the most sense.

Seeing if we can move things quicker through the ports is clearly one aspect of that, and we will look at the virtual arrival aspects as well.

CHAIRPERSON NICHOLS: Okay. So you'll add that to the list of things that are part of the discussion or part of the review?

TECHNICAL ANALYSIS SECTION MANAGER TARICCO: Yes, uh-huh.

CHAIRPERSON NICHOLS: Okay. Good.

EMISSIONS ASSESSMENT BRANCH CHIEF DONOHOUE: And, Bonnie or Paul, on the issue of what we're doing and what we have done with respect to viscosity, would you all like to respond to that one?

STAFF AIR POLLUTION SPECIALIST SORIANO: I'll start with that one. And then if Paul has some additions to it, he can add them at the end.

In my presentation, I did mention that viscosity

is one of the key issues in the distillate fuel. And it does have significantly lower viscosity than the heavy fuel oil. And so we have been looking at it -- we've looked at it a number of ways, in terms of we have -- our Enforcement Division, we have gotten all their records, which is over, at the time, 4 to 500 samples, and we looked at the viscosity of all those samples. And that was one of the things that led us to propose this extension, because we did find that the viscosity levels of the fuels from .1 to .5 percent sulfur were 25 percent higher than the viscosity for the fuel at .1. So that's one of the issues.

Also, I talked about that enhanced fuel specification. And I continued to give the wrong number for the fuel specification, because I work on a testing spec too. But there's a new fuel grade called DMZ, and it has a three centistoke minimum fuel viscosity.

So we believe that this viscosity issue is being addressed in a number of different ways by our Phase 1 extension and by these enhanced fuel specifications.

We also -- I think we would have to be very careful in specifying a minimum viscosity level. It's very dependent -- the engine manufacturers do have a minimum that they specify for their engines. But it's very -- the fuel viscosity is very specific on temperature

and operation. And so for us to provide a minimum, I just think it's too specific to the type of vessel.

So I think in terms of extending the Phase 1 and the enhanced fuel specifications are two prongs that have been used to approach that issue.

CHAIRPERSON NICHOLS: Well, obviously this is of great interest to the shippers, to every -- it's a safety issue. You know, loss of power is not something to take lightly.

It seems to me that everybody's sort of converged on viscosity as the answer or the problem. Are we clear that that's the only thing that could be responsible for the problems that have been experienced?

STAFF AIR POLLUTION SPECIALIST SORIANO: It is one of the key issues. When California Maritime Academy did the study, they found some other -- training, whether the vessels operated in an automatic kind of setting or whether there's an engineer that's actually down at the engine. That can change some parameters.

But viscosity is one of the key fuel issues.

EMISSIONS ASSESSMENT BRANCH CHIEF DONOHOUE: But as we've talked about this whole thing, there's a need to continue to investigate this closely. That's one of the reasons why it makes so much sense to have a delay right now and not have another change within that. As we look

at this more closely, we do think there may be other things that will come up. But as we have, all these people together, the experts both from the fuel, from the engine side and all that, we think we can work through this issue and certainly address the issues of both the loss of propulsion and other operational issues that they're seeing. And that's why we just think it makes sense.

We from here -- you know, we have in place a very concerted effort with all of the effected things, particularly with the Coast Guard on working very closely on these. We have a lot of additional things that we are going to be requesting and following up on to see, as we can delve deeper into this issue, to make sure that we really are addressing it, particularly before we make the next step down to the .1 sulfur fuel.

CHAIRPERSON NICHOLS: Well, Any time there's a change in fuel, there's always a need for a very careful rollout. So I'm glad to hear that you're working on that.

EMISSIONS ASSESSMENT BRANCH CHIEF DONOHOUE: Now, would --

TECHNICAL ANALYSIS SECTION MANAGER TARICCO: I just wanted to add one more thing.

The Coast Guard has been very helpful in this matter. And we do have someone here today, Michael

Boyce -- Do you want to raise your hand, Michael. He's been excellent to work with. And they've been working to get the word out too. As they learn things when they investigate, like loss of propulsions, you know, they get that information back out to the industry. And they have a vested interest in making sure this works too, because the ECA is right around the corner. And, you know, we have the benefit now of we're learning. We're kind of the pilot here. And the more we can understand this, the more successful the ECA will be too, and I think we all want that to happen.

EMISSIONS ASSESSMENT BRANCH CHIEF DONOHOUE: The next one with respect to the VSR issue, Peggy, can you respond to that one?

TECHNICAL ANALYSIS SECTION MANAGER TARICCO: Yeah, I'll try to respond, and then you can add things that I might miss.

Well, I think the Chairman is very familiar with this, because I think the concept of slowing vessels down has been around for a long time. I think we first started looking at this back in the 90s. So we did make a commitment to do a technical evaluation of vessel speed reduction programs in the AB 32 Scoping Plan in our SIP and a diesel risk reduction plan, that we would see, you know, if it can work, how to implement it. Because of

resource issues that's been delayed a little bit.

The good news is that even though it's been delayed, there's a very successful program being implemented at the two largest ports in the state, the Port of Long Beach and Los Angeles, where they are slowing vessels down. They have a very high rate of compliance in part because they've incentivized the Vessel Speed Reduction Program, that vessel operators will get a reduced dockage fee if they slow their vessels down.

So I think a big chunk of the benefits that we could get from a VSR program here in California is already occurring, thanks to the ports.

We will still complete the technical report. We've committed to do that, and we'll get going on that later again this year. There's going to be some really tough questions to answer though as we look at this. Because, you know, what's the best way to implement this type of a program? Is it voluntary? Is it regulatory? Is the state the best agency to be mandating speeds for ships? Or is another agency, an international body or the Coast Guard? Are they in a better position to establish those ship speeds?

The other thing we need to keep in mind here is that what we're asking today is to try to keep the vessels out of the sea range and get them back in the channel. A

Vessel Speed Reduction Program could undo that work here today and incentivize vessels to go back through the sea range. So we need to keep that in mind.

We also have to keep in mind our longer term air quality goals. As you look to the future, we know we're going to have to get more reductions from ships. So we're going to have to look at -- when we look at VSR, kind of look at it in the context of a broader range of measures, what's going to be the best way to get the next set of reductions from vessels? And we will do that. We think it's a little premature at this point to commit to adopting a regulation to mandate vessel speed reductions, but we do think there's merit in continuing to look at it as a one way to reduce emissions, and we will do that as we look at our program.

CHAIRPERSON NICHOLS: I understand the explanation and I think it makes good sense. I just think, you know, it would make also sense to include the advocacy groups that have been working with us on trying to defend this regulation and our authority in a very difficult area to, you know, have them involved in looking at the same kinds of analyses that you are. So I think that will help us come up with something more sustainable in the long run.

EMISSIONS ASSESSMENT BRANCH CHIEF DONOHOUE: We

certainly will.

I think there's just two real short questions left. One had to do with the .1 sulfur fuel availability. And there were some comments made about early compliance. About 40 percent of the samples that we've done so far is at or less than .1 fuel. So there is a fair amount out there. There are people using it. Looking at the regional basis from where these came, we are seeing .1 fuel available in most of those regions, probably in fairly limited quantities. Except for South Africa, we're not seeing too much come out of there.

So we're doing pretty well on that. We are going to follow this .1 sulfur fuel availability very closely, because it's also linked to other fuel properties that we're concerned about. So that's something that we're going to be following. And if there is an issue on that, we're certainly going to, you know, bring that back to you all and let you know what's happening.

Then the final one was really why not go out to 2015. That does make a lot of sense from actually dovetailing with the ECA. The issue is, as you saw in the previous presentation, these reductions are very critical SOx reductions. These are, as we talked about, essential for achieving the PM SIP commitments, which come in in 2014. This regulation has provided about -- as is has

provided about 50 percent of those reductions needed. So that's -- you know, originally we looked at that as the most practical way. But we have some air quality requirements that we need to meet. And so that's why we're recommending 2014.

CHAIRPERSON NICHOLS: All right. Thank you.

Dr. Balmes.

BOARD MEMBER BALMES: I just wanted to echo your comments about the vessel speed reduction issue. I appreciate from staff the complexity of this issue. And I also appreciate from the Navy they don't want to see -- if we're hoping to get the vessels through the channel corridor not to reverse that by vessel speed reduction concept that's not well thought through.

But I would encourage staff along with the Chairman to try to navigate this difficult issue with the various agencies. And, you know, maybe we're not the right agency to spearhead this. But I think it would be useful if we could figure out a way to amplify what's already being done by the ports in Long Beach and L.A.

EMISSIONS ASSESSMENT BRANCH CHIEF DONOHOUE: Just one final comment on that. We are seeing additional movement on the international level to look at greenhouse gas reductions from shipping. In fact, at the July IMO meeting coming up, they are going to initially start

looking at the idea of is it reasonable to try and get emission reductions by some type of international vessel speed reduction. So at least they're beginning right now to start looking at that. I know the time line is probably longer than what we usually like. But at least it's up there for consideration, which is a good thing.

CHAIRPERSON NICHOLS: Considering how long it took to get the IMO to address the sulfur issue, it's practically warp speed.

BOARD MEMBER BALMES: I would just encourage us to be actively engaged in those discussions.

CHAIRPERSON NICHOLS: We should be encouraging that.

If there are no further questions -- we've already closed the record. I should ask for any ex partes communication. Yes, down here.

BOARD MEMBER BERG: I did have one phone call with Coalition for Clean Air with Candice Kim and Martin Schlageter. I should say that was on June 20th.

BOARD MEMBER BALMES: And I also had a phone call on June 20th with Candice Kim, Coalition for Clean Air, and John Kaltenstein, Friends of the Earth.

BOARD MEMBER D'ADAMO: Same phone call, June 20th, but adding Steven Sanders.

CHAIRPERSON NICHOLS: All right. Thank you all.

May I have a motion to approve Resolution 11-25 which contains the staff recommendation?

BOARD MEMBER D'ADAMO: So moved.

BOARD MEMBER RIORDAN: Second.

CHAIRPERSON NICHOLS: All right. All in favor please say aye.

(Ayes)

CHAIRPERSON NICHOLS: Any opposed?

Great. Thank you all very much. Good work. Successful.

We are not quite done, although I think we may lose a quorum. That doesn't prevent us from finishing what we need to do.

We do have several persons who have requested to testify during the open comment period, most of whom are here to talk about the drayage truck regulation, although Martin Schlageter had asked to talk to us about economic benefits of the regulation.

So I'm going to ask our Vice Chair Ms. Riordan to take the gavel such as it is. To take charge and thank everybody for their attendance. And she and/or our counsel will explain if we need to what the status of these public comments is. Thank you.

ACTING CHAIRPERSON RIORDAN: Thank you, Madam Chairman.

First of all, let me invite people that are going to speak under public comment, Martin Schlageter, Gloria Stockmyer, Miguel Silva, Bill Aboudi, Dominick Lee, and Ron Light to come down to the front row, please, and then we will proceed.

Those of you who have participated under public comment, remember that you do have our traditional three-minute rule, just as we do during the hearings. And so I'm going to ask that you observe that with the lights as we have them.

And also to remind you that under public comment, these are items that the Board has jurisdiction over but that are not on the agenda. And we cannot take any formal action today as a result of your testimony.

However, we can ask staff to investigate or work with you or make some disposition perhaps of those issues that you bring to us. Some are simply informational, and I would assume that our first speaker is going to be more of an informational one. And others may have some requests. And we will handle it that way.

Martin, I'm going to begin with you. If you'd give us your name, as all of you who are testifying, if you would begin with your name. And if you're representing an organization or a company, if you would give us that information as well.

So, Martin, let's start with you.

MR. SCHLAGETER: Thank you so much.

Martin Schlageter with Coalition for Clean Air. I submitted through the Clerk to you an executive summary of a paper the Coalition for Clean Air recently released.

ACTING CHAIRPERSON RIORDAN: We have that.

MR. SCHLAGETER: I wanted to share that with you because it's a series of case studies showing business and economic benefits from greenhouse gas and other pollution regulations that have been initiated here at CARB.

The shipping clean, growing green, how companies are earning more by polluting less at California ports. Goes through a wide variety of sources in the ports of freight transportation sector and gives case studies where economic benefits are being achieved, efficiencies are being found, new markets are being opened up, and green technologies are being developed. And that is the vision of greening the economy that is I know a part of our California mandate here, of which CARB is so important.

One of the findings I want to highlight there in this report to you is that it is a call for us collectively to be resilient and committed to the deadlines that we set when we set forth regulation. Emerging companies and investors and green technology developers and workforce training programs are all reliant

upon the commitment you make when you set clean air regulations. These clean air regulations are creating markets. They're improving efficiencies, as I said. And they're creating jobs here in California.

And so to stay committed to your deadlines and stay committed to your standards allows investors and emerging companies to plan and to be assured of the marketplace that they are planning for and gaining investment around. As we came across today, certainly there are necessary changes that occur.

But know that to stay committed to your regulations is one way of helping ensure that the green economy continues forth. And these emerging companies, which are feeding companies that are trying to comply with your regulations, they need to be protected by a commitment to those regulations. Companies that are investing to comply need your continued vigilance in rooting out companies that are trying to skirt compliance.

So these are -- this is a report that I think you'll find useful and encouraging and I wanted to share with you today as a way to raise my pom-poms as the cheerleader for clean air regulations.

Thank you.

ACTING CHAIRPERSON RIORDAN: Thank you very much, Martin. And we do have that and we will keep that.

Okay. Next speaker will be Gloria Stockmyer.

MS. STOCKMYER: Good afternoon. My name is Gloria Stockmyer, Stockmyer Trucking.

I'm here today to comment on the Board's decision in December to dismiss staff's recommendations to offer the same concessions and delayed rules to drayage trucks that you have given to trucks governed by the truck and bus regulations. Your decision shows your failure to acknowledge the substantial investments made by many of the 5400 drayage trucks that visit the Port of Oakland regularly.

Based on information that CARB published, a lot of the trucks went and purchased 2004, '05, and '06 engine model trucks with the plan of retrofitting them. And now they're being told that there are no certified filters or retrofit devices. So these men and women are stuck with trucks that are worthless. And they're stuck with payments and they can't sell them. And if they were able to sell them, they couldn go buy a 2007 model truck. But because they've been de-valued by this decision, they're going to be jobless.

And, you know, I really ask that you reconsider and revisit this issue. Very important to a lot of drivers. Thank you.

ACTING CHAIRPERSON RIORDAN: Thank you very much

for your presentation. I think we'll take it all. And because all of the speakers are on this subject, then we'll respond at the end.

The next one speaker will be Miguel Silva.

MR. SILVA: Hi, members of the Board. My name is Miguel Silva, and I work with Horizon Freight Systems in the port of Oakland.

First of all, I wanted to thank you for responding to my comments regarding your decision not to send Phase 2 of the drayage truck rule back in December. Unfortunately, the letter that I received from the Board was extremely disappointing, not only because you denied my request to reconsider your decision, but because the reasons were inadequate. It failed to justify the decisions to potentially put thousands of port drivers out of business for minimal environment benefit, while granting relief to non-port truckers.

You tell us that the Board found it necessary to retain Phase 2 requirements to protect residents of the impacted communities from exposure to diesel PM and ozone. Yet, you failed to recognize the cleanest trucks in those communities currently are the drayage trucks.

A 2010 air district study found an anticipated 40 percent in reduction in NOx emissions at the port due to the replacement of many older polluting trucks that had

occurred in Phase I implementation. But yet you continue to allow significant emissions from non-port trucks through those same communities and freeways.

The balance of emissions today has changed. And there is no valid justification for widening the disparity between the trucking rules. If the goal is to protect communities like West Oakland, Phase 2 will not achieve that goal.

You also say that the Board concluded that retaining existing Phase 2 requirements would provide fairness within the drayage truck industry to the truck owners who have made greater investments in new trucks; that delaying Phase 2 requirements would have favored truck owners who have not yet invested in pollution controls and penalizes the owner/operators of fleets driving cleaner trucks.

This statement is elitist. It favors wealthy companies and punishes the poor. Every truck that currently serves the port of Oakland has made investments in pollution control, be it by retrofitting the trucks or by purchasing newer year model trucks that they could afford. All have made sacrifices commensurate to their economic situation. Phase I already has played a heavy financial burden on port truckers. To ignore that seems to be deliberately contemptuous of the plight of the

working class. Many have gone out of business. Many have incurred high interest rate loans and large amount of debt. Port truckers have done their share and more to meet State clean air regulation at a great personal cost.

Not delaying Phase 2 to favor a handful of wealthy companies at the expense of thousands of owner-operators made up of mostly low income minorities is discriminatory. The Civil Rights Act of 1964 requires your agency under State law to conduct your program, policies, activities in a manner that ensures the fair treatment of people of all races, cultures, and income levels, including minority populations and low-income population of the state.

I think it would be inappropriate and unlawful to proceed to implement these policies without mitigating or even looking at the impending devastating impact of your decision.

Thank you for the time.

ACTING CHAIRPERSON RIORDAN: Thank you Mr. Silva.

Mr. Aboudi.

MR. ABOUDI: We've been here since 9:00. And my name is Bill Aboudi. I'm with AB Trucking. I work at the port of Oakland. I've been there since 1988.

And I've learned over the years that before you punch somebody because they're stepping on your toe, you

better tell them. So I want to tell you, you guys are stepping on all of our toes at the port of Oakland. We've had enough.

I've gone from 13 trucks to six trucks. We've been suffering for the last three years. The promises that were made to us are not kept. The money didn't come. Then you call us something like an actor that came late to the show, that we didn't apply early. It's bull. We applied when the outreach was done. The money ran out. Didn't run out for one or two. It ran out for 1300 people; 1300 people that stood in line day and night to try to go through this process.

You've overcomplicated the system. I've attended every drayage workshop that was in Oakland. We've participated in everything. We tried to do everything. This is not the way it was supposed to go. We were going one year ahead of on-road rule. We're being backed by the money, because we're the guinnea pigs. And we're being slaughtered right now.

And you have to look at it. This is a very dangerous situation. You can talk to Cynthia Marvin. You can talk to Diane Bailey from NRDC. We have done our best to comply with everything. We want to reduce pollution. We live in those communities. We interact with that community.

But your decisions and what you're doing is not correct. The 2004, '05, and '06, that rule was changed after people were led to believe that that's an option that they had. The years were shortened. Then we were told that we didn't promise you that there was going to be a DPF that would reduce NOx. We had hoped. What does that mean? How do you make a law hoping that somebody was going to do something? You have to make sure. Just like with the earlier regulation, you're mandating. You're watching. You're adjusting. You've adjusted it for on-road rule. Why not adjust it for the port drayage trucks that reduce the pollution by 50 percent, NOx by 40 percent?

We did that already. We upgraded our trucks. We upgraded it on our own dime; 2700 of us upgraded on our own dime. Didn't take a penny. 1300 got -- instead of 20,000, we got 5,000.

So we can always ask the military to go ahead and give them some efficiency so they can do their test a little faster and give us that $30 million that they burn in one day. If you have that kind of money, we'll buy brand-new trucks or the two-million-dollar bus.

ACTING CHAIRPERSON RIORDAN: Thank you.

Dominick Lee.

MR. LEE: Members of the Board, my name is

Dominick Lee. I'm with VA Transportation in Oakland, California. There's about 90 owner-operators working there.

As you can probably already tell, we are a little bit upset in Oakland at this decision that was made in December. We are all, of us here, work in Oakland. We are not one-time visitors. Especially like my guys, 90 owner-operators, 80 percent of my guys stay at the port all day.

If you want to talk about emissions to problem that were there previously and the correction that was done is largely due to the community of truckers like me and me colleagues here based in Oakland itself.

I also had the pleasure the past year to be on the Truckers Work Group in Oakland where you sent your staff members down on a monthly basis to talk about amendments to be made to the drayage rule based on the affects of the economy.

And I'm kind of a little bit -- not upset -- I don't know if you were misinformed, but some of the basis that we got from Mr. Goldstene on behalf of Chairman Nichols was based upon drayage industry or the port industry is rebounding. I don't know where you really got that. We haven't responded or rebounded at all. I went from having about 170 trucks in about 2006 to running

about 80 trucks in the port of Oakland. There's about half of that.

Now, if you look at Journal of Commerce, we may have rebounded last year, but all steamship lines -- and I believe my customers estimate money for us to trickle down and be economically better. They've all lost hundreds of millions of dollars in the first quarter. They're all bracing for another 2009 where some steamship lines have lost over a billion dollars. If there is to be any relief made to the trucking community, it should come to the drayage. It should come to the guys that have already invested house payments and are seriously looking for relief.

The gentleman here earlier talked about you need to keep deadlines and technology and all that. I think sometimes we jump ahead of the schedule and propose deadlines when don't have technology. There is these guys that went out there and bought 05-06 trucks with the promise of technology to keep on working until 2020. You don't have that available. And at this point, you're proposing options for them that are just not viable at this point.

It's a promise. If it's not there, then some changes need to be made to make accommodations for these truckers that want to stay at work. It's about fairness.

And I think sometimes we all sit here and play a zero sum game. I think there could be compromises that could be made and keep everybody working.

I am seriously asking you guys to reconsider and keep Oakland's port drivers working. Thank you.

ACTING CHAIRPERSON RIORDAN: Thank you, Mr. Lee.

Mr. Lee, the Committee that you mentioned just briefly, how many are on that Committee that you just mentioned?

MR. LEE: You're talking about the Truckers Work Group?

ACTING CHAIRPERSON RIORDAN: Yes.

MR. LEE: Well, Truckers Work Group is a monthly meeting put on the trucking community in the Port of Oakland and is open to all terminal operators, steam ship lines, and all trucking companies that serve the port of Oakland, including truckers who come in from the valley as well.

ACTING CHAIRPERSON RIORDAN: But individual truckers can be there?

MR. LEE: Yes, ma'am. And actually, that's really been the misinformation. I mean, for a year, you sent staff down saying there's going to be amendments made, extensions made to the filters, extension made to their trucks. And, you know, within ten minutes, you guys

change your mind as to take that away from them. That's what I'm asking you --

ACTING CHAIRPERSON RIORDAN: But the group represents pretty fairly all of the interests in the area?

MR. LEE: All of Oakland truckers, yes.

ACTING CHAIRPERSON RIORDAN: Thank you. Appreciate that.

Mr. Light.

MR. LIGHT: Good afternoon, Madam Vice Chairman -- is it -- and Board members. My name is Ronald Light. I'm Executive Director of West State Alliance, which is the Port of Oakland Truckers Trade Association. I'd like to try to hit a few high points, if I may.

Our organization over the past six months has submitted comments to Chairman Nichols, to the Board members individually, to the Board collectively during the last 15-day open comment period. We can only hope that you avail yourselves of our written comments where we go into great detail and analysis and documentary support of our various positions.

I was coming here, I raised the question -- I posed the question to myself what would be the best course of action at the point in which to address all of you today? What I believe that it is, is to question what your intentions were on December 17th and whether or not

the Board was fully aware and fully apprised of the consequences of their actions and of their intentions when you made the decision not to enact the delay to the Phase 2 NOx regulation, which would have postponed the rule from 2014 to 2020. So it's within that vein that I would like to continue.

As a couple of my colleagues have alluded, a research scientist at U.C. Berkeley, Dr. Rob Harley, was commissioned by the ENAQMD to conduct a study this last year to determine to what extent there had been emission reductions from 2009 to the advent of the Phase I PM regulation in January 1st -- or actually, it's more like June of last year.

And as my colleagues have alluded, there was a 50 percent reduction in PM diesel emissions and an unanticipated 40 percent reduction in NOx. And that's extremely significant, because what it reflects is the fact that as older trucks were phrased out and newer trucks were purchased largely at the expense of the port truckers themselves, it's created a vast unanticipated improvement in NOx reductions, thereby eliminating the need to remain consistent with the implementation schedule for Phase 2 that had been adopted.

And in fact, staff had proposed, as you well know, a delay in implementation of the Phase 2 rule until

2020, in part to reflect the fact that there were far fewer emissions being emitted into the atmosphere during this period.

As my colleagues also have intimated, one of the big issues was the fact that when the Phase 2 rule was originally adopted by this Board, it was predicated on the existence of not only PM filters, but of NOx reduction filters. And in the case of vehicles of 2004, '05, and '06 engines, the idea was that as those trucks required diesel filtration that a dual purpose diesel and NOx emission reduction filter could be purchased and retrofitted. In fact, that does not exist. It has not been developed. It's not been submitted to the CARB Board. It's not been approved. It's not on the market.

So all of those 2700 truck owners have no option when it comes time for them to retrofit their trucks. They would do so -- this is with PM emissions filters. They would do so with the fore knowledge that on January 1st, 2014, that their trucks would no longer be compliant due to the NOx emissions rule. That means they need to purchase a $20,000 filter and keep them in compliance for perhaps one year.

I'm sorry I've gone over. I did have a few more points to make.

ACTING CHAIRPERSON RIORDAN: I felt that because

you represented a larger group, you could have 15 seconds extra.

Mr. Light, I appreciate your comments. And I thank you. And I'm going to have to tell you I have to review your submittals. And maybe other Board members will have some questions.

And I'm sorry, Board members, I didn't ask if there were any questions on your behalf for any of the other speakers. But this would be the time. And then I'm going to ask staff to perhaps make some remarks and make a suggestion about where we might go from here.

But first let me just invite any questions, if there are any, Board members.

BOARD MEMBER BERG: I'd be interested in what staff has to say.

ACTING CHAIRPERSON RIORDAN: Mr. Goldstene.

EXECUTIVE OFFICER GOLDSTENE: Thank you, Ms. Riordan.

We'll ask Cynthia Marvin to provide a brief overview and provide context of where we are. She can respond to some of what you just heard.

ACTING CHAIRPERSON RIORDAN: And then perhaps some direction what the next step might be. Why don't do you the overview and response.

ASSISTANT DIVISION CHIEF MARVIN: Thank you.

We certainly are very well aware of the level of concern in Oakland. Have spent a fair amount of time listening to those concerns, looking ourselves at what was possible from the system standpoint, and also trying to assess what the impact is in terms of the number of trucks.

So the letter that Chairman Nichols had sent back to Miguel Silva and the West State Alliance on behalf of many of the truckers who spoke today really attempts to go through each of the substantive issues that they raised and provide the facts as we understand them.

I think in terms of overall context, we absolutely are making progress, and happily so, in reducing diesel pollution at west Oakland.

As Dr. Harley's study confirms, I think it's important to note those improvements are due to a combination of cleaner trucks, cleaner ships, cleaner ship fuel, cleaner cargo handling equipment, really the whole spectrum of sources that operate in that community. So many of those are cleaner due to the Board's regulations, but it's not solely trucks that are driving that improvement. We're certainly happy for it, regardless.

In terms of where we go in the future, many of these folks did submit comments in the 15-day comment process on the changes to the drayage rule. So staff will

be going through the prescribed process to evaluate and respond to those comments.

Separate from the regulatory process, I've been in some discussions with the city counsel member from Oakland who has raised many of the same financial concerns and expressed an interest in looking at how we can find new ways to help finance additional upgrades at the port of Oakland. And what we've talked about doing is trying to combine the State's loan and loan guarantee programs that are expanding right now, as Ms. Berg is well aware, and perhaps combine those with funds generated or developed by the city of Oakland so that there is a stronger financing program available.

In the letter back from Chairman Nichols to the West State Alliance, we did note the recovery or the rebound at the Port of Oakland. That was not in the analysis of any one company's economic state. It was a statistical look at the amount of cargo that's flowing through the Port of Oakland. And what we see by the Port of Oakland's own statistics is that the cargo volumes have returned to the pre-recessionary levels. So that tells us that there is a need to stay vigilant in terms of requiring cleaner trucks and also that ultimately that business will provide a source to help finance those cleaner trucks.

ACTING CHAIRPERSON RIORDAN: Mr. Goldstene.

EXECUTIVE OFFICER GOLDSTENE: I think at this point we are in the middle of the process of the 15-day process where we will respond to the comments we've received.

I agree with Cynthia that the letter from Chairman Nichols already responded to the issues raised here. And what we can do is make sure we distribute that to the Board so you have that information.

ACTING CHAIRPERSON RIORDAN: Yes, Dr. Balmes.

BOARD MEMBER BALMES: Well, I appreciate your comments, Cynthia.

But being from Berkeley, I know that the City of Oakland is in a great financial straits. When you talk about partnering with the city to try to generate some more funds, is there any reality there on the city side? Not to mention the State budgetary issues.

ASSISTANT DIVISION CHIEF MARVIN: Excellent question. And that was part of my discussion with the city counsel member.

I think I'm realistic enough not to expect the city itself to provide funding. But what she was talking about was looking at some of the economic development funds that may be available for the city or some of its subsidiaries, non-profits to apply for as a financing

mechanism.

So I can't answer the question. I can just tell you that there is a local elected official who wants to go for that, try it, and we committed to work with her.

EXECUTIVE OFFICER GOLDSTENE: I've been corrected by Mr. Fletcher. We did send the letter that Mary sent to the Board already, but we can re-send it.

MR. ABOUDI: Can I have a rebuttal?

ACTING CHAIRPERSON RIORDAN: No. I think based on fairness --

MR. ABOUDI: But there's wrong information being dished out.

ACTING CHAIRPERSON RIORDAN: I realize there's a disagreement --

MR. ABOUDI: It's not a disagreement. It's inaccurate information that's been dished out to the Board.

EXECUTIVE OFFICER GOLDSTENE: We'll finish the rule making process. In that forum and in that context, we will reply to the comments.

ACTING CHAIRPERSON RIORDAN: And I think, Mr. Goldstene, then what -- after you've done that, I think because of the interest shown by the speakers that then the -- it would be helpful if you then made that information available to us. Lots of times after the

15-day comment period is over or the period is over, then we just -- that moves on. I think in this case perhaps we'd like to be a little bit more aware of the response.

In terms of looking at opportunities for funding, realistically, cities are in straits now. State is in a straight.

If the port has come back financially -- well, not financially. Let's say the trade or the commerce there has come back, is the port doing anything to help in this regard at all? No. All right. No.

ASSISTANT DIVISION CHIEF MARVIN: Unfortunately, no. But that would certainly be another potential source of funding to help the sort of financing program.

ACTING CHAIRPERSON RIORDAN: Have we contacted -- forgive me, because you probably have told me this and I just don't remember.

Have we contacted them? Have we asked them? Have we worked with them at all to see if there was any interest in helping?

ASSISTANT DIVISION CHIEF MARVIN: We've certainly had that discussion, both the Air Resources Board staff and the Bay Area Air Quality Management District staff have had that discussion repeatedly with the port of Oakland. But we are willing to have that again.

ACTING CHAIRPERSON RIORDAN: I think it would

bear, you know, doing it again.

I think sometimes if people are presented as we have been today with some of the individual stories, you know, maybe there would be an interest.

I don't know if there is a model to follow in the ports of Long Beach and L.A. Maybe there is a model there. Do I not remember they did something?

ASSISTANT DIVISION CHIEF MARVIN: Down in southern California, the two big ports were very aggressive in both setting their own requirements for access to the port for cleaner trucks. They established a dirty truck fee. They raised money by allowing those dirty trucks to come to the port prior to the ARB regulation. And they took that money, and then a number of port operators revenues and greatly subsidized the transition to cleaner trucks.

The port of Oakland contributed $5 million to the overall funding program that was implemented in 2009 and 2010. But it is a much smaller contribution proportional than the southern California ports. They considered doing a gate fee and a similar program to the L.A. and Long Beach situation, and the Oakland Port Commissioners declined to pursue that approach.

ACTING CHAIRPERSON RIORDAN: Are they governed similarly -- the three ports -- in other words, is there

any difference in the governance and the way it's set up?

ASSISTANT DIVISION CHIEF MARVIN: I think there are some technical differences. But from a general sense, I would say each of the ports are run by an appointed Board of Commissioners or the Port of Harbor Commissioners generally appointed by the cities where those ports are located. So in Oakland, the Mayor appoints the Boards of Port Commissioners.

BOARD MEMBER BERG: But they do run independently.

ACTING CHAIRPERSON RIORDAN: But I'm trying decide where to put the -- I mean, we obviously need to have a discussion, we and Bay Area and all. But I'm looking at those who are in the audience and I'm thinking where would their time be best spent if we were looking for some additional resources that would mirror what's happening down in the other two ports.

And I'm going to make a suggestion -- not knowing the exact governance and how they're set up. But usually the Port Commissioners or Board members, however this governance is designed, they need to hear from you. And you may have been there many times. But if we go and talk, you go and talk, maybe something can happen based on our belief that commerce has returned to that port.

Now, if it hasn't, then that's a different story.

But if it has, then I think the case could be made that you need to be there along with us, not physically in the same room at the same time, but there at their public meetings and we at our meetings. And that's what I'm going to suggest to everybody.

But I would like our staff -- if the Board agrees with me -- to go back and have another conversation with them and explain to them what has happened in the other ports and that there is a real interest on our part to see some effort being made to help with the finances.

EXECUTIVE OFFICER GOLDSTENE: We'll talk to the port and the air district. And we'll also keep the Board informed as we move forward on completing the 15-day process.

ACTING CHAIRPERSON RIORDAN: Thank you. Thank you, Mr. Goldstene. Any other comments, Board members?

With that, then we'll adjourn our meeting. And I thank you very much.

(Thereupon the California Air Resources Board meeting adjourned at 3:43 p.m.)

CERTIFICATE OF REPORTER

I, TIFFANY C. KRAFT, a Certified Shorthand Reporter of the State of California, and Registered Professional Reporter, do hereby certify:

That I am a disinterested person herein; that the foregoing hearing was reported in shorthand by me, Tiffany C. Kraft, a Certified Shorthand Reporter of the State of California, and thereafter transcribed into typewriting.

I further certify that I am not of counsel or attorney for any of the parties to said hearing nor in any way interested in the outcome of said hearing.

IN WITNESS WHEREOF, I have hereunto set my hand this 9th day of July, 2011.

TIFFANY C. KRAFT, CSR
Certified Shorthand Reporter
License No. 12277