

STATE OF CALIFORNIA – THE RESOURCES AGENCY  
BEFORE THE  
CALIFORNIA ENERGY COMMISSION (CEC)

In the matter of, )  
 ) Docket No. 13-IEP-1L  
 )  
2013 Integrated Energy Policy )  
Report )  
(2013 IEPR) )

California Energy Commission

**DOCKETED**

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Joint IEPR-Transportation  
Lead Commissioner Workshop  
Transportation Energy Scenarios

California Energy Commission  
1516 Ninth Street, Hearing Room A  
Sacramento, California

Wednesday, July 31, 2013

9:04 A.M.

Reported by:

Kent Odell

## APPEARANCES

Commissioners

Andrew McAllister, IEPR Lead Commissioner

Hazel Miranda, Commissioner McAllister's Advisor

Janea Scott, Transportation Lead Commissioner

Jim Bartridge, Commissioner Scott's Advisor

Staff

Suzanne Korosec, IEPR Lead

Tim Olson

Lynette Green

Also Present (\* Via WebEx)

Presenters

Philip Sheehy, ICF

Allen Schaeffer, Diesel Technology Forum

Mary Solecki, Environmental Entrepreneurs

\*Plinio Nastari, Datagro Brazil

Russell Teall, California Biodiesel Alliance

Joe Gershen, California Biodiesel Alliance

Tom Koehler, Pacific Ethanol

Adam Walter, Propel Fuels

\*Joel Velasco, UNICA Sugar Cane Industry Association of Brazil

\*David Greene, Oakridge National Laboratory

Eileen Tutt, California Electric Transportation Coalition

Catherine Dunwoody, California Fuel Cell Partnership

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## APPEARANCES (CONT.)

Presenters (Cont.)

Mark McLoughlin, California High-Speed Rail Authority

Rosa Dominguez-Faus, UC Davis Institute of  
Transportation Studies and Graduate School of Management

Tim Carmichael, California Natural Gas Vehicle Coalition

Johannes Escudero, The Coalition for Renewable Natural  
Gas

Fred Silver, CALSTART

Public Comment

Robert Bienenfeld, American Honda Motor Company

Simon Muoi, Natural Resources Defense Council

\*Roger Gault

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California Electric Transportation Coalition

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1

1 P R O C E E D I N G S

2 JULY 31, 2013

9:04 A.M.

3 MS. KOROSSEC: All right, we're going to go ahead  
4 and get started.

5 I'm Suzanne Korosec. I manage the Energy  
6 Commission's Integrated Energy Policy Report Unit.

7 Welcome to today's Joint IEPR and Transportation  
8 Workshop on Transportation Energy Scenarios.

9 A couple of housekeeping items before we get  
10 started. Restrooms are in the atrium out the double  
11 doors and to your left.

12 Please be aware that the glass exit doors near  
13 the restrooms are for staff, only, and will trigger an  
14 alarm if you try to exit the building that way.

15 We have a snack room on the second floor, at the  
16 top of the atrium stairs, under the white awning.

17 And for lunch we've provided a list of  
18 restaurants within walking of the building on the table,  
19 out with the other handouts.

20 If there's an emergency and we need to evacuate  
21 the building, please follow the staff out of the  
22 building to the park that's diagonal across the street,  
23 and wait there until we're told that it's safe to  
24 return.

25 Today's workshop is being broadcast through our

1 WebEx conferencing systems and parties do need to be  
2 aware that you are being recorded.

3 I will make an audio recording available on our  
4 website in a couple of days and we'll post a written  
5 transcript about three weeks after the workshop.

6 We have a very full agenda today, with a lot of  
7 material to cover so we're limiting questions during the  
8 Q&E, after each block of presentations, to those from  
9 the dais.

10 But we will provide an opportunity for questions  
11 during our public comment periods, one before lunch and  
12 one at the end of the day.

13 If we can't get to your question due to time  
14 constraints, you can send questions directly to Tim  
15 Olson, whose contact information is in the notice that's  
16 out on the table with the handouts, and he will forward  
17 that on to presenters to get you a response.

18 During both public comment periods we'll take  
19 comments first from those of you in the room, then  
20 followed by people participating on the WebEx and,  
21 finally, from those who are on the phone, only.

22 When it's your turn to speak, please come up to  
23 the center podium and use the microphone so that the  
24 WebEx participants can hear you, and so that we make  
25 sure we capture your comments on the transcript.



1           It's also helpful if you can give our court  
2 reporter your business card either before or after you  
3 speak, so that we make sure that your name and  
4 affiliation are spelled correctly in the transcript.

5           To give everyone a chance to speak we're  
6 limiting each speaker to three minutes, and we'll have a  
7 countdown clock on the main screen to help you gauge  
8 your time.

9           I encourage you to be brief and just hit the  
10 high points of what you have to say, and then follow up  
11 with more detailed written comments after the workshop.

12           For WebEx participants, you can use the chat  
13 function to tell our WebEx coordinator that you want to  
14 ask a question or make a comment. And we'll either  
15 relay your question or open your line at the appropriate  
16 time.

17           For phone-in-only participants, we'll open your  
18 lines after we've taken comments from the in-person and  
19 WebEx participants.

20           Written comments on today's topics are due close  
21 of business August 9th, and the workshop notice explains  
22 the process for submitting written comments to the IEPR  
23 docket.

24           So with that I'll turn it over to Tim Olson to  
25 provide a brief introduction before we have opening

1 comments from the Commissioners.

2 MR. OLSON: Good morning Commissioners, and the  
3 others who are here today, the participants for this  
4 workshop.

5 We scheduled this workshop to gather information  
6 for consideration in the transportation section of the  
7 2013 Integrated Energy Policy Report.

8 And you can see from the agenda that we're  
9 talking about transportation energy scenarios, primarily  
10 alternative fuels, but there are going to be some other  
11 topics raised in here, too.

12 And our main objective is to get better  
13 information about the contributions that several fuel  
14 options offer today and projected into the future.

15 Many of the speakers that have agreed to speak  
16 today are emphasizing between now and 2020. Some are  
17 looking beyond 2020, and they're today beyond 2020.

18 We asked speakers to comment on a few items.  
19 And the way we looked at this, it was a very simple  
20 request. And what you're going to find today is there  
21 are lots of complex responses to that simple request.

22 But in essence what we've asked is what  
23 contribution will you make to California's  
24 transportation energy sector at least to 2020?

25 And you'll find, also, that the way the agenda's

1 kind of structured many responded in terms of fuel  
2 produced, trying to quantify the amount of fuel that  
3 will be produced year by year through that, or at least  
4 some point, 2020 at the earliest.

5 Associated with that is -- with the fuel  
6 production is the number of vehicles and the  
7 infrastructure needed to support that. And you'll hear  
8 from some presenters that they're just focusing on  
9 infrastructure, or they're really trying to address all  
10 three of those parts of the kind of projection.

11 We also asked the speakers to comment on the  
12 factors, key factors that substantiate that growth. And  
13 you'll see that the responses, most of them emphasize  
14 some kind of price comparison.

15 Fuel, their fuel or their electricity in one --  
16 electricity and natural gas, or some type of liquid fuel  
17 compared to petroleum price. You'll see that in some of  
18 the presentations.

19 You'll also see other factors that will be  
20 addressed; consumer response, technology advances,  
21 business models, investment appetite, and then a whole  
22 realm of government interventions in the form of  
23 regulations, incentives, permitting process, and that we  
24 also asked the speakers to describe challenges that  
25 impede the ability to meet these growth goals.

1           We also asked, invited speakers, and for the  
2 most part any participate today to make recommendations  
3 on government actions.

4           This is the type of information that we're  
5 interested in that will go into this transportation  
6 chapter and, hopefully, we'll get -- I'm sure we're  
7 going to get some very good comments and  
8 recommendations.

9           We're also interested in using the information  
10 today to sum up where we are in addressing mandates and  
11 government policies, legislation, including the targets  
12 for petroleum displacement coming out of the 2003 AB  
13 2076 report, revisited in 2007 in the AB 1007, that  
14 Alternative Fuels Plan.

15           Greenhouse gas emission reductions under AB 32,  
16 low carbon fuel standards, zero emission vehicle  
17 Executive Order and ZEV mandate, the use of our  
18 incentive money and, hopefully, we'll be able to get  
19 some comments on the SB 375 kind of regional land use  
20 planning, how it affects vehicle miles traveled  
21 reduction.

22           An aspect that's related to this information  
23 today will come in through another part of the report,  
24 at a future date, and that's the -- I referred back to  
25 the use of incentive money.

1           There's also a benefits report that's a  
2 companion to that. Jim McKinney and the staff of the  
3 Emerging Fuels Office are working on that and that will  
4 go into this 2013 Integrated Energy Policy Report, too.

5           So with that, that's kind of the objective for  
6 today. And we're looking forward to -- we've got a  
7 pretty intense schedule of speakers, and Power Point  
8 presentations. And so let's continue on and launch into  
9 it.

10           COMMISSIONER MC ALLISTER: I'll take your hint  
11 here and be very brief here, Tim.

12           So, my name is Andrew McAllister, I'm the Lead  
13 Commissioner on the Integrated Energy Policy Report for  
14 2013.

15           And we have in front of us another of what is  
16 shaping up to be a really interesting and rich day of  
17 presentations and discussion, in particular today on  
18 transportation issues.

19           To my left is Commissioner Janea Scott, and to  
20 her left is her advisor, Jim Bartridge. So, I'm really  
21 happy to share the day with Janea.

22           And, actually, I will have to be stepping out in  
23 the afternoon, so she'll be on her own this afternoon,  
24 but ably will steer the ship, I'm certain.

25           And I'm actually really sad to miss the -- like,

1 particularly, the first panel in the afternoon,  
2 Electrification and Hydrogen panel, because I think  
3 that's going to be a really interesting one and a really  
4 rich area for discussion. So, I'll be tracking that one  
5 ex post.

6 Let's see, I guess I just want to I mean state  
7 somewhat the obvious, but just give a few -- make a few  
8 points here. That transportation is so critical, it's  
9 huge, and ever huger in our context in terms of its  
10 percentage of the impact that it makes as we clean up  
11 the electric grid, for example, or as we make our  
12 buildings more efficient. Those go down as a percentage  
13 of the total greenhouse gas emissions.

14 And transportation, I think, is a particularly  
15 tough nut to crack in terms of the emissions and all the  
16 different things that are wrapped up with it.

17 We're lucky in that there are lots of -- there  
18 are a number of terrific technologies here, today, on  
19 the horizon. A lot of smart people are looking at this  
20 and a lot of really great potentials for getting  
21 emissions down on the technology side.

22 But there are many, many social systems around  
23 transportation, as well, and those prove to be  
24 remarkably difficult to modify over time.

25 Certainly, the plug for SB 375 I think is really

1 apt because the regional governments, I know, are really  
2 working hard to figure out how to engineer, and fund,  
3 and shift around their transportation planning to  
4 decrease the impacts and still allow people to get  
5 around in their regions.

6 And they're, obviously, a local government made  
7 up of local governments and are very -- under a lot of  
8 pressure to be accountable to their constituencies at  
9 the local level.

10 And we need to tap into that as we develop State  
11 policy, that's critical.

12 Also, you know, there are a lot of different  
13 technologies. Each of them has a market and these  
14 markets are interrelated. And, you know, we have some  
15 funds at the State level to kind of push and prod in  
16 different directions that we want things to go.

17 But the vast majority of the capital is going to  
18 come from the markets and, you know, basically kind of  
19 responding to policy, but making decisions as markets  
20 tend to do.

21 So, I think it's really critical to understand  
22 those issues in some depth to work with the providers  
23 and understand the services so that we can make the  
24 right policies that don't get cross-wise with those.

25 And just, finally, I'll highlight behavior.

1 It's just critical. And in the energy-efficiency realm,  
2 certainly behavior is a rich -- not new area, but I  
3 think it's a burgeoning area of research because we've  
4 realized that widgets, while they can save us a lot of  
5 energy, they actually have to be adopted. And people  
6 make choices to purchase them, and install them, and  
7 they have to run properly.

8 And there's lots of behavior, there's lots of  
9 human interface with all of these technologies.

10 And that goes doubly, I would say, for  
11 transportation, and the technologies, and how people get  
12 around and lead their daily lives.

13 So, I just think this arena is so, so critical.  
14 Now, obviously, I'm not the Lead Commissioner on it and  
15 that distinction belongs to Commissioner Scott.

16 So, clearly, I think there's a lot of heavy  
17 lifting on her plate. You know, I have enough on my  
18 plate, frankly, but I really think that all of these  
19 pieces have to fit together seamlessly.

20 And I'm looking forward to learning more this  
21 morning and following up later on the workshop.

22 Now, with that I'll pass it to Commissioner  
23 Scott.

24 COMMISSIONER SCOTT: Thank you. Good morning  
25 everyone. I'm Commissioner Janea Scott. And I just



1 want to thank you all for attending today's Joint IEPR  
2 and Transportation Workshop.

3 As you know, I am the Lead on the transportation  
4 issues here at the Commission and in particular for the  
5 Alternative and Renewable Fuel, and Vehicle Technology  
6 Program.

7 And as I look around the room and see a lot of  
8 familiar faces, I'm guessing most of you have heard of  
9 that program.

10 So, as part of the IEPR the Energy Commission  
11 conducts these types of assessments and forecasts for  
12 all aspects of energy industry; supply, production,  
13 transportation, delivery and distribution, demand, and  
14 prices.

15 And we use these assessments and forecasts to  
16 help provide an analytic foundation for developing the  
17 State's energy policies.

18 The transportation energy demand forecasts  
19 increase our understanding of changes in current and  
20 expected fuel consumption, and how consumers and  
21 businesses respond to the changing market conditions,  
22 advances in technologies, and government policy  
23 initiatives.

24 Tim Olson, in his introduction, laid out for you  
25 kind of what we're hoping to learn today, and all of the

1 different folks that we are expecting to hear from, so I  
2 won't repeat that.

3 But I do think it's going to be a very  
4 informative, interesting, thought-provoking set of  
5 presentations that we will have here.

6 So I'll just again say thank you so much for  
7 joining us today. We've got folks from as far away as  
8 D.C., and Brazil, and we've got people WebExing in. So,  
9 we should have a really great chance to hear from a lot  
10 of experts and I'm looking forward to today's  
11 discussions.

12 MR. OLSON: Okay, let's proceed. We're going to  
13 start with a presentation that I think is kind of an  
14 overarching, covers lots of different options. And the  
15 author, one of the authors is Philip Sheehy. He's going  
16 to make that presentation.

17 And I think it's important because this will  
18 give us kind of an understanding of how multiple things  
19 will contribute.

20 And Philip Sheehy's with ICF. This study was  
21 done on behalf of several clients. Many of the people  
22 in this room helped pay for that.

23 And I'd like to introduce Philip Sheehy.

24 MR. SHEEHY: Thank you, Tim. Great, thanks Tim,  
25 Commissioners and CEC staff. Can everybody hear me okay

1 on this? I just want to make sure. All right.

2 Yeah, thanks for having me today. Tim actually  
3 didn't ask me about my personal contribution to  
4 California's transportation energy in the future. I  
5 ride my bike to work. I live in San Francisco. So, my  
6 contribution is pretty minimal.

7 When I do drive a car, I'm a City Car Share  
8 member. They've got a lot of electric vehicles in their  
9 fleet, so I've got a pretty small footprint. But I did  
10 drive up here to Sacramento for today, so that increases  
11 it somewhat.

12 So, Tim did ask me to give an overview of some  
13 work that ICF has done for a variety of stakeholders.  
14 And I want to set the context here of this, the scope of  
15 our work is related to the discussion we're having here  
16 today, related to transportation energy forecast.

17 But there's a slight different in what we were  
18 asked to do. So, here's an overview. I'll give you an  
19 introduction to our work, some of the scenarios we  
20 developed.

21 And then the last piece, the market snapshots  
22 answers one of the questions that Tim asked about what  
23 are the justifications for some of the forecasts that  
24 you guys have.

25 So, just to give you an idea of the scope, so we

1 were retained by a multi-stakeholder group, including  
2 the California Electric Transportation Coalition,  
3 Natural Gas Vehicle Coalition -- I missed a word in  
4 there, sorry, Tim -- E2 Series, National Biodiesel  
5 Board, and then the Advanced Biofuels Association.

6 And we were looking at compliance with the LCFS.  
7 So this study ended, it looks at between now and 2020.  
8 And it's a macro-level study, so it's an appropriate  
9 overview here.

10 But we weren't -- we're looking at, again,  
11 compliance with LCFS, which is slightly different than  
12 asking the question what is the transportation energy  
13 outlook?

14 I think there's a very subtle difference there,  
15 but they are real.

16 And I'm going to be talking about the first part  
17 of that study today, the reference case and LCFS  
18 compliance scenarios, and then we're doing some economic  
19 modeling on that.

20 The first phase of this report is public.  
21 Everything I'm presenting today is based on a report  
22 that's available publicly. I'm not going to delve into  
23 some of the -- I'm going to delve into some of the  
24 numbers specifically, but I'm not going to delve into  
25 every single number because A, I don't have time and, B

1 the numbers are out there, available.

2 And if you have any comments, my contact  
3 information is at the end so I'd be happy to address  
4 those.

5 I'm just going to go through this so that I have  
6 enough time on the other one. So this, I like to use  
7 this slide. I've been testing things out in various  
8 forms. I got a good reception yesterday. I hope it's  
9 received well here today.

10 So, this slide to me, at least, sets the  
11 framework for our analysis. I think it helps people  
12 understand what we're looking for.

13 So, the Y axis you have carbon intensity. The  
14 low carbon fuel standard requires a 10 percent reduction  
15 in the carbon intensity of transportation fuels by 2020.

16 On the X axis you have time, between 2011 and  
17 2020, the time frame of that analysis.

18 Where these fuels land on this graph is a  
19 reflection of their carbon intensity, between zero and  
20 100. You can think of gasoline and diesel around 100.  
21 The two lines at the top are the standard.

22 And then where they fall on the graph in terms  
23 of their horizontal position determines where they play  
24 a role, what we consider a significant role, which is a  
25 relatively subjective term, in LCFS compliance.

1           So, you can see -- but this graph is useful to  
2   set up, you know, how we look at LCFS compliance because  
3   the lower you are on the graph -- the lower on the graph  
4   you are, the lower carbon intensity kind puts downward  
5   pressure on how much volume you need to be able to get  
6   into that market to have an impact.

7           The higher you are on that graph, looking at  
8   biodiesel from soybeans, or ethanol made from corn in  
9   the Midwest, those are up around, you know, 80 to 90  
10   grams per megajoule. You need higher volumes, right, to  
11   get that 10 percent reduction.

12           But if you're biodiesel from corn oil, or  
13   biomethane, you're further down, you need fewer volume.

14           So, this is kind of the push/pull that we're  
15   looking at when we're looking at compliance with the low  
16   carbon fuel standard.

17           If you're in the middle, somewhere in the  
18   middle, you know, you've got hydrogen. You've got  
19   renewable diesel, around 30, that's still pretty low.  
20   Even like a blend of biomethane and conventional  
21   compressed natural gas, that blend would put you  
22   somewhere around 50.

23           So, you know, these things are what we consider  
24   when we're looking at compliance with the low carbon  
25   fuel standard, and availability of these fuels out to

1 2020.

2           If I don't mention your fuel today, I know there  
3 are a lot of fuel producers and representatives from  
4 various industries today, please take no offense. It  
5 has nothing to do with -- it's just the scope of our  
6 study, what we're looking at.

7           I'm not going to mention too many very specific  
8 pathways, so please don't take offense. That's a good  
9 qualifier to add.

10           So, I'd like to -- again, I just want to hammer  
11 this home that some notes on the scope of our analysis.  
12 You know, we're looking at 2020, so I didn't want to get  
13 into the details of what the low carbon fuel standard,  
14 how it's implemented. But there's basically credits and  
15 deficits and they must balance out to zero.

16           We hit a zero balance in 2020, right. So,  
17 that's a slightly different exercise than forecasting,  
18 saying in principle there could be, you know, over  
19 compliance in 2020.

20           What we're trying to do -- we think in general,  
21 however, that the market will achieve pretty close to  
22 balance in 2020 depending on how LCFS is going to be  
23 implemented post-2020, which isn't something that was  
24 included in our analysis.

25           So, that's a caveat and something to consider as

1 we talk about some of these transportation fuels.

2 One other note, and this comes out of a  
3 discussion I had yesterday, we did not assume any shifts  
4 in the carbon intensity of the crude slate that comes  
5 into California. That changes the outlook. If the  
6 carbon intensity of the crude slate that is refined in  
7 California or fuels that are delivered to California,  
8 then that increases the need for credits, which  
9 increases the need for alternative fuels.

10 We did not consider that. We assumed that it is  
11 effectively frozen in 2013, which puts it around -- the  
12 carbon intensity of gasoline and diesel around that 98  
13 grams per megajoule. I think that's another good  
14 disclaimer there.

15 All right, data sources, we talked to some folks  
16 at CEC, we talked to ARB. We have contracts with --  
17 well, we have relationships with DOE and NREL. The  
18 Department of Energy, EIA, we used some of their  
19 forecasting.

20 We looked at biofuels, we're looking at USDA.  
21 We also have quite a bit of looking at a lot of imports  
22 into California, so that requires us looking beyond the  
23 United States' boundaries, so we're looking OECD and the  
24 Foreign Agricultural Service from USDA, we need some  
25 numbers for there.



1           And then we had our multi-stakeholder group that  
2 funded the study. We had an opportunity to discuss what  
3 their internal projections were.

4           And I think it's important to mention that, so a  
5 lot of these projections are informed by our discussions  
6 with our multi-stakeholder group, but ICF is ultimately  
7 responsible for these projects, and we were the filter.

8           So, what you see is not necessarily consistent  
9 with what you will hear later from some of the  
10 stakeholder groups because, ultimately, ICF modified  
11 those based on our own internal research.

12           All right, high level observations, we're  
13 looking at a future in which biofuel blending is the  
14 easiest, or one of the best ways towards compliance just  
15 because it's -- the other ways that we're looking at,  
16 natural gas, hydrogen, electricity, those are fuels that  
17 require a new vehicle.

18           And fleet turnover, as people in this room  
19 understand, is difficult to achieve, so there's a delay  
20 there. And those fuels also require the purchase of a  
21 new vehicle. They require, generally, some new  
22 infrastructure, an expansion of infrastructure.

23           So just to be clear, none of these scenarios are  
24 necessarily easy. That's the compliance with LCFS,  
25 we're not claiming that it's easy or going to be a

1 cakewalk, but we're looking at the feasibility of the  
2 deployment of low carbon, liquid biofuels that can be  
3 used to blend, along with what we consider advanced  
4 vehicle technologies, which is kind of a catchall term  
5 for anything that requires, like I said, these new  
6 vehicles, infrastructure, et cetera.

7 I've got a couple scenarios. I'll talk about  
8 some of the differences there.

9 But generally one of them, the scenario one has  
10 slightly higher penetrations of advanced vehicle  
11 technologies, like natural gas and electricity, and a  
12 little bit of extra hydrogen.

13 And that puts some downward pressure on liquid  
14 biofuels. However, biofuels are still, aggregated  
15 together which includes a variety of biofuels, both  
16 alcohol-based and then hydrocarbon-based biofuels are  
17 still, grouped together, the largest contributor towards  
18 compliance.

19 Again, this is another relevant aspect.  
20 Because, again, we're looking at achieving that net zero  
21 balance in 2020. We're looking at over compliance in  
22 some of these early years of LCFS in order to achieve  
23 compliance.

24 So, we're looking at -- we think that is a  
25 strong motivator for some of the near-term deployment of

1 alternative fuels because there's an opportunity to over  
2 comply in early years and bank those credits. We've  
3 already seen that behavior in the market. At the end of  
4 2012 there was in excess of 1.4 million credits.

5 That doesn't necessarily speak to the liquidity  
6 of that market, but there are an excess of credits  
7 generated. Whether or not those start to be traded is  
8 another issue.

9 Our analysis, again at a high level we're  
10 looking at good opportunities to substitute for diesel,  
11 looking at natural gas, biodiesel and renewable diesel.  
12 There is no such thing in the LCFS as a gasoline credit  
13 or a diesel credit. So, the credits are fungible.  
14 There's not anything, necessarily, that says you have to  
15 hit the 10 percent target in gasoline pool or in diesel  
16 pool. So, we think that there's an opportunity in the  
17 diesel sector.

18 And this is something that's relatively new  
19 compared -- or I think it's becoming more accepted, but  
20 it's something that wasn't necessarily out there.

21 And there are some other studies that I would  
22 argue ignored this aspect.

23 So, in general I'm just -- so we're going to  
24 focus on some nascent developments, but these are things  
25 that we found promising and which reflect most of our

1 projections here.

2 I think everybody has my presentation, a  
3 hardcopy of it. If you don't, it's online. So, in the  
4 interest of time I'm going to skip these two slides.

5 But just generally I'll talk about this, some of  
6 the things we looked at. Basically, what these slides  
7 are communicating is that we capped various things based  
8 on market constraints. We've made assumptions in other  
9 ones.

10 So, you can walk through these in your own time  
11 and if you have any questions about these scenarios, I'd  
12 be happy to answer them. I'll talk about some of them  
13 as we go through some of the individual slides. Again,  
14 just in the interest of time I'll keep moving there.

15 So, what I'm going to do here, next I just want  
16 to walk through some of these, fuel-by-fuel. Again, I'm  
17 not going to mention everybody's fuel in this room so  
18 please don't take offense. These are -- I was charged  
19 with giving the first presentation of the day which  
20 means I have to -- I'm trying to keep it pretty general.

21 You could also blame my colleague, Jeff  
22 Rosenfeld if I miss something, instead of me. That's  
23 useful, too.

24 So, a lot of this is, again some of these are  
25 our observations, but some of it is just out there based

1 on reports that UC Davis has done, an update on Air  
2 Resources Board -- on the LCSF Program. I don't think  
3 any of this is groundbreaking. Some of it is new, I  
4 think.

5 We found that conventional ethanol producers are  
6 lowering their carbon intensity. Based on the number of  
7 pathways that have been submitted you can see there's  
8 downward pressure on the carbon intensity.

9 This doesn't necessarily change the outlook for  
10 ethanol. It just changes the carbon intensity outlook  
11 for ethanol.

12 In effect, we don't have much increase in the  
13 volumetric consumption of ethanol in California. We  
14 have some increases in some of the scenarios because we  
15 did consider E15. I'll get to that in a second.

16 But by and large the ethanol market isn't  
17 changing that much in our scenarios. It's really just  
18 changing in terms of what the carbon intensity is.

19 And I highlighted here California ethanol is --  
20 ethanol that's produced in California is, you know,  
21 currently a score of around 80 grams per megajoule.  
22 They're seeking to maintain competitiveness in this  
23 market.

24 You know, based on our interviews, they're keen  
25 on dropping that to 70 grams per megajoule. And again,

1 that's feedstock changes, feedstock switching, and then  
2 some process improvements.

3 Pacific Ethanol went offline recently to  
4 improve, like I think they ended up -- I don't know what  
5 they've officially released, what their efficiency  
6 improvements are, but the news releases were like I  
7 think they were expecting a 3 to 4 percent improvement  
8 which, when credits are trading at \$60 a ton, you might  
9 as well go get that 3 percent.

10 We looked a Brazilian sugarcane ethanol. This  
11 is a hot topic. I've got a colon and a semicolon in  
12 there, that's pretty clever.

13 So, sugarcane ethanol is a very popular one that  
14 people like to talk about. We had about 9 million  
15 gallons imported by Marine last year. Most people  
16 believe that that was -- the main driver there was RFS2.  
17 That's ICF's view, also.

18 We do think that there is some pull from LCFS,  
19 though, and we think that there's a lot -- so, some  
20 projections from 2010 and 2011 had Brazil -- I think  
21 there's a woman from Brazil presenting today, but  
22 there's a -- or from a Brazilian company.

23 I mean at the high level there were export  
24 estimates of Brazilian sugarcane ethanol around 300 to  
25 400 million gallons out to 2016. And, you know, we

1 imported 500 million gallons in the states last year.

2 So, there is a motivation here. It's a cost-  
3 effective solution towards compliance with both RFS2 and  
4 LCFS. You know, we can have a separate conversation  
5 about the policy impacts of fuel swap.

6 But the reality is that sugarcane ethanol based  
7 on its carbon intensity score and how it's ranked in the  
8 RFS2 program we see a future for that.

9 And, you know, we capped this around 500 million  
10 gallons import by 2020 in California, but we did  
11 consider it.

12 Cellulosic ethanol, we had a couple hundred --  
13 we worked with E2 on this. This one I think we end up  
14 with close to 500 million gallons by 2020 that's  
15 accessible to the California market.

16 Again, that's probably middle of the road. Some  
17 people would believe that is nonsense, but some people  
18 would think that might be low. So, we kind of found the  
19 middle ground there.

20 It's certainly been a market in which there have  
21 been setbacks. We recognize that.

22 There are some success stories, which I think is  
23 good to communicate. KIOR, in Mississippi, is up and  
24 running, I think at the end of June.

25 Edeniq, I think they are in Visalia, California.

1 Don't quote me on that. And they're reporting their  
2 performance based on hours, not gallons yet. So, you  
3 know, it's nascent, again nascent.

4 And then ZeaChem I think is in the order of  
5 thousands, hundreds of thousands of gallons.

6 So, again, these aren't to say that these aren't  
7 making major contributions to LCFS now, but we're  
8 starting to see a little bit more movement than we were  
9 a year ago.

10 And E15, I'll -- I think we've got the volumes  
11 for ethanol right. If you want to discuss with us  
12 whether or not it was E15 or E85, we'd be willing to  
13 engage in that discussion, but we'll skip that for now.

14 For biodiesel we see -- again, I mentioned  
15 earlier that we saw a lot of room for biodiesel. You  
16 know, we were using on the order of 10 million, 15  
17 million gallons of biodiesel a year in California before  
18 some of these regulations -- or before LCFS kicked in.  
19 We've seen that, you know, we think this year's going to  
20 be much higher than that.

21 I like to use this chart here. It's just a  
22 table of the feed sack consumption for biodiesel  
23 production in the United States. You see not a lot of  
24 movement in canola oil and soybean oil, those both have  
25 pretty high carbon intensities in the look-up tables.



1 But you see a big change in corn oil, almost a hundred  
2 percent increase in the production of biodiesel from  
3 corn oil, which has that four grams per mega joule.

4 And then you see a pretty big increase, about a  
5 30, 40 percent increase from recycled feeds. And those  
6 are the ones that have a low carbon intensity and that  
7 we think will end up in California.

8 So, we have biodiesel. You know, biodiesel is  
9 less than a percent right now of the diesel mix. And in  
10 our scenarios we end up around 15 percent by 2020.

11 So, biodiesel on the infrastructure side, I'd  
12 like to talk about this instead of just production. So,  
13 we interacted with CEC on a variety of projects on this  
14 and there were some CEC reports. I think it might have  
15 been from the last Transportation Energy Forecast, but  
16 I'm not sure. It might have been from an AB118 report.

17 But, you know, as recently as 2010 they were  
18 effectively saying there's no -- or there's very little  
19 biodiesel terminal storage.

20 So now, just publicly, you know, Kinder Morgan  
21 is -- they've got a couple facilities that are looking  
22 at 19 to 20 million gallons per year at each facility.

23 We had communications with members of our -- of  
24 folks on the multi-stakeholder group who funded this  
25 study, there were four refiners there.

1           ICF did a survey of more than 95 -- or about --  
2   I think it was 96, so why say more than 95. About 95  
3   petroleum terminals in California, and we didn't get  
4   responses from everyone. But for those that we did, we  
5   make these estimates of about 230,000 barrels of  
6   biodiesel storage capacity in California today. I  
7   believe that's a conservative estimate.

8           If you assume that those tanks have 75 turns per  
9   year, again, I believe that's a conservative estimate,  
10   then you're already looking at a biodiesel blending  
11   capacity of 110 million gallons annually, which is a  
12   pretty big change from just a couple years ago. So,  
13   this is one of the things that we looked at.

14           To reach a level of B15, B10, B15 in our  
15   scenarios you're looking at like about another couple  
16   hundred million gallons there.

17           So, we've added, I would say conservatively, 110  
18   million gallons capacity of blending biodiesel now. A  
19   doubling of that would get us pretty close to the  
20   scenarios that ICF developed for our compliance  
21   situation.

22           Drop-in biofuels, renewable gasoline and  
23   renewable diesel, you know, some people refer to these  
24   advanced hydrocarbons. These effectively have the same  
25   chemical composition of gasoline and diesel, and are

1 fungible. There are still considerations, you can't  
2 just -- they're not always just dropped in, regardless,  
3 based on pipeline constraints.

4 But I'm going to spend a little bit less time on  
5 these and I hope these people aren't offended.

6 So, we do see a shift towards, a little bit  
7 towards renewable gasoline.

8 I talked to Mary, you'll hear more from Mary  
9 Solecki recently -- or this afternoon, excuse me. Or  
10 maybe this morning, I don't know when you're talking,  
11 Mary.

12 But there's been some shift from cellulosic  
13 ethanol production, these kind of waste products that  
14 people believed would go into the ethanol market to now  
15 there's been a little bit more shift towards renewable  
16 hydrocarbon production. And I'm going to leave that to  
17 Mary to discuss that a little bit more.

18 We didn't have very much renewable gasoline in  
19 our scenarios, to be honest. We're looking at around  
20 100 million gallons accessible to the California market  
21 by 2020. It might have even been less.

22 So, renewable diesel -- also, sorry, just real  
23 quick, some pause from us on the renewable gasoline. We  
24 see a lot of price projections and I'm sure somebody  
25 will talk about that later today.

1           A lot of these price projects are -- the  
2 feedstock costs, for whatever reason it ends up being  
3 about \$50 per dry ton of whatever the feedstock is. So,  
4 I don't think that -- if you back calculate it, almost  
5 everybody's hovering around this \$50 per dry ton and ICF  
6 hasn't been able to find a really reliable source for  
7 that \$50 per dry ton of feedstock. So, that gives us  
8 some pause in terms of what renewable gasoline is going  
9 to look like.

10           Renewable diesel, you know, this one is coming  
11 on like gangbusters. Neste Oil invested a couple  
12 hundred million dollars during the global economic  
13 downturn to build a facility in Singapore. I think they  
14 might have expanded their facility in the Netherlands.

15           It's not necessarily a punch for Neste Oil, but  
16 they were investing a lot of money when other people  
17 weren't and I think that's paid off today.

18           We've heard as much as 100 million gallons of  
19 renewable diesel being delivered to the California  
20 market. The driver is the tax credit, but it's still  
21 here.

22           A good portion of that is from tallow and that's  
23 a low carbon pathway.

24           There's this facility in Louisiana that just  
25 came online about a month ago.

1           So, we again, we're looking at around -- I think  
2 we maxed out around 150 million gallons of renewable  
3 diesel in the California market by 2020. So, you know,  
4 in the tens of millions of gallons over the next couple  
5 of years, of the low carbon sort. So, some of this 100  
6 million gallons is palm oil, I believe, so not all of it  
7 is included in our scenarios.

8           So, one thing for us on the biodiesel side of  
9 what will happen when the tax credit goes away, if it  
10 goes away what will happen.

11           So, not to say that -- I'm not trying to make  
12 the argument that the biodiesel market will collapse by  
13 any means, we really think that biodiesel is going to be  
14 an important player in California. It's just how much  
15 of that renewable diesel will be coming here. That  
16 dollar per gallon tax credit is a big draw for places  
17 like -- or folks like Neste.

18           So, what will the import markets look like when  
19 that tax credit goes away? So, there's some uncertainty  
20 there. And I don't want to overstate that uncertainty,  
21 but it is real.

22           So, natural gas, I think everybody knows this,  
23 natural gas is cheap. Tim will tell you how cheap  
24 later.

25           The initial folks here, you know, transit

1 agencies, I would say that's a success story of folks  
2 like the California Energy Commission, CARB, local air  
3 pollution districts have been pushing natural gas into  
4 transit agencies since 2000, you know. So, you're  
5 looking at already a base of 85 million gallons, you  
6 know, which is a half to two-thirds of the market.

7 And those folks are already earning credits and  
8 so that kind of -- there's probably some expansion from  
9 there.

10 So, you know, everybody or most people, I think,  
11 are familiar with Cummins Westport. They have a handful  
12 of natural gas, heavy duty vehicle offerings -- or  
13 engine offerings, excuse me, not the full vehicle.

14 But there are some surprising developments here,  
15 I think that communicate some of the -- or that  
16 demonstrate some of the -- why we're a little bullish on  
17 natural gas in some of these scenarios is you're  
18 starting to creep down into some of these light, heavy  
19 duty, medium duty markets, which there's a lot of miles  
20 driven in those and there's a lot of carbon reductions.

21 Again, we're looking at LCFS compliance. But  
22 there's a lot of carbon reductions to be had there and  
23 there's a lot of savings to be had there.

24 So, you know, we're talking about OEM  
25 developments here. GM is looking at the Silverado;

1   you've got Chrysler with the RAM 2500. These vehicles,  
2   there aren't a ton of them on the road, but there's  
3   enough out there and they drive a lot of miles, that's  
4   an important note.

5           And then you've got a conversion kit for the F  
6   Series. We think that's pretty big. The F Series is  
7   one of the top ten selling trucks. There aren't a ton  
8   of trucks in California that are sold, but the F Series  
9   is in the top ten, so that's a big driver there.

10          You know, this is -- I talk more about the  
11   medium duty, kind of short haul market. When we're  
12   starting to talk about goods movement and longer haul  
13   we're looking at LNG.

14          Here, you know, people are expanding. The  
15   Topock -- I was talking to my colleague, Jeff Rosenfeld,  
16   Topock facility got financing in September of 2012 to  
17   expand their facility right across the border.

18          I believe, we're pretty sure the Boron facility,  
19   that Clean Energy operates in Southern California  
20   expanded recently.

21          There are -- you know, their natural gas,  
22   getting into the LNG sector is happening. I believe  
23   it's Clean Energy is partnered with Pilot, Flying J, I  
24   think, is to build the natural gas highway across  
25   America.

1           So, there's a private investment in LNG. And we  
2 don't have it coming in like gangbusters, but it  
3 actually surpasses CNG consumption by 2020 just based on  
4 it getting into the heavy duty market.

5           And then biogas, yesterday I gave a similar  
6 presentation and just said biogas, biogas, biogas, so I  
7 thought I should probably expand on that a little bit.

8           There's a lot of potential for biogas. Biogas  
9 is generating RINs and it's generating LCFS credits.  
10 There is a very strong driver for any molecule of  
11 renewable natural gas to make its way to California.

12           There is a significant pole here. And we have  
13 biogas amounting to about 10 percent of natural gas  
14 consumption in 2020 which some people would argue is  
15 conservative.

16           There's already, you know, based on our back  
17 calculations, around 5 million gallons that have -- 5  
18 million diesel gallon equivalents in the California  
19 market, so there's room for that to expand quite  
20 significantly. As the LNG market and as the CNG market  
21 expands you're going to have the vehicles, and you're  
22 going to have the infrastructure.

23           And biogas there's going to be a lot of -- we've  
24 already have seen a lot of investment in getting that  
25 into the transportation sector.



1           Electricity, we focused on light duty. So, in  
2   our analysis our baseline is ZEV. So, there's a most  
3   likely compliance scenario that ARB has developed and  
4   that's publicly available. We used that as the  
5   baseline.

6           We built on that in one of the scenarios and had  
7   more aggressive penetration of electric vehicles with  
8   the focus on plug-in hybrids. Some bump in fuel cell  
9   vehicles and some bump in battery electrics, but the  
10   major bump was in plug-in hybrids.

11           The main reason there partly is because of we  
12   think that could be a major compliance strategy with  
13   CAFE and tailpipe standards.

14           So, again, I think that similar to the argument  
15   related to ethanol consumption, E15 versus E85, we think  
16   the amount of electricity that we have in our scenarios  
17   is likely appropriate. Whether or not it's happening in  
18   a BEV or PHEV is a factor.

19           So, you have -- you may have some detractors  
20   about EV sales. Some of them are -- some people say the  
21   sales are underwhelming. However, in California I would  
22   argue they're actually doing quite well. They are  
23   surpassing some expectations and especially in -- I live  
24   in San Francisco, our market is about almost 15 percent  
25   of the electric vehicles in the nation are in San

1     Francisco, or in the Bay Area, I should say.

2             So, those are already -- you know, I think  
3     electricity is accounting for 1 to 2 percent of LCFS  
4     credits right now. That's pretty big.

5             So, we think that -- so there are a couple of  
6     other things we're seeing here. You know, there's  
7     economies of scale from decreasing battery prices.  
8     These things people promote regularly.

9             But the other thing is there was a major built  
10    out of battery capacity and we think there's going to be  
11    a bit of a run on it here and that will decrease the  
12    price of batteries, people trying to move them.

13            So, we think that, again, there's been a short-  
14    term boost for battery-electric vehicles. We think that  
15    will be short term. We think there will be a shift to  
16    PHEVs.

17            I've included data from a survey here that KPMG  
18    does with auto executives every year.

19            Surprisingly, I think the downsizing of  
20    vehicles, turbo charging, things like that is included  
21    in there, these power train technologies.

22            The question was what are you investing in over  
23    the next couple of years effectively to comply with  
24    regulations?

25            And, you know, you see a very close second there

1 is plug-in hybrid. So, these are there near-term  
2 investments which, in the time frame of that survey was  
3 three to five years, I believe. So, you have a very  
4 strong interest from auto executives in plug-in hybrid  
5 technology.

6 So, that's what's driving our forecast with the  
7 shift towards PHEVs more so than BEVs. No particular  
8 disdain for one or the other.

9 We did look at electricity in heavy -- we  
10 considered electricity in heavy duty applications.  
11 Ultimately, we did not include -- we did review it, but  
12 we did not include any electricity used in on-road  
13 applications in medium duty or heavy duty.

14 There are demonstration projects out there.  
15 L.A. Metro is demonstrating three electric buses. So,  
16 again, this is not to say that it's not possible, we  
17 just didn't think that it was going to make a very  
18 significant contribution to the LCFS, again which was  
19 the scope of our study.

20 We did look at off-road applications. I won't  
21 get into that too much. But again we do think that to  
22 the extent that off-road applications make a  
23 contribution towards the transportation energy scenarios  
24 that the Energy Commission is considering that  
25 electricity in off-road applications is something that

1 needs to -- should be on the radar beyond forklifts.  
2 Forklifts are important and they are probably one of  
3 the -- like have the highest demand in terms of  
4 electricity pull, but there are others that are likely  
5 to increase in the future.

6 So, I kind of went through a lot there. I don't  
7 if we're taking -- I think we're taking -- am I taking  
8 questions now?

9 All right, we'll take questions there, so start  
10 from the dais first.

11 COMMISSIONER MC ALLISTER: I think we're going  
12 to keep things rolling.

13 MR. SHEEHY: Good.

14 COMMISSIONER MC ALLISTER: Yeah, no, but that  
15 was really informative. Thanks very much. And we may  
16 have questions for you as things proceed, so stick  
17 around.

18 MR. SHEEHY: All right.

19 MR. OLSON: Okay, and just to repeat that we're  
20 going to -- questions from the audience and from the  
21 online we'll do at the end of the morning.

22 If the Commissioners would like to raise a  
23 question, you're welcome to after every speaker, that's  
24 up to you.

25 Our next speaker's Allen Schaeffer. And his

1 presentation is a little out of order. Originally, we  
2 were putting all the vehicle information in the  
3 afternoon, but he has a travel constraint and we decided  
4 to see if we could get him to do this presentation in  
5 the morning and he's agreed to do that.

6 Allen is an executive with the Diesel Technology  
7 Forum and has some pretty interesting information on  
8 trends and diesel technology. So, Allen please come up.

9 MR. SCHAEFFER: Thank you very much, Tim, and  
10 good morning Commissioners. Thank you very much for the  
11 time this morning and it's great to be here in  
12 California, and at the forefront of thinking about  
13 energy and transportation policy and actually doing  
14 about energy and transportation policy.

15 This morning I'd like to share with you a few  
16 introductory observations about diesel and technology,  
17 and then share with you some new research, both on light  
18 duty diesel vehicles and heavy duty vehicles. And then  
19 some final concluding remarks.

20 I'll say at the outset, while diesel engines  
21 power a significant portion of many sectors of  
22 California's economy, including non-road, farm, and  
23 construction, marine and power generation today's  
24 comments and our research will focus only on on-road  
25 light and heavy duty vehicles.

1           First, I would be remiss without recognizing the  
2 Diesel Technology Forum members, who are the true  
3 leaders in clean diesel technology, representing engine  
4 and equipment manufacturers, fuel suppliers, and  
5 emissions control technology companies. So, we thank  
6 them for their leadership and support of the work of the  
7 Forum.

8           Just to be clear about what we're talking about  
9 today, there are many definitions thrown around in the  
10 light duty and heavy duty world, but for the purposes of  
11 our presentation we're going to look at light duty  
12 diesel vehicles as passenger cars, SUVs, light trucks,  
13 and the heavy duty diesel pickup trucks, heavy duty  
14 pickup trucks that have a diesel engine option and vans  
15 as well.

16           And our basis for doing that is because, while  
17 many of these vehicles are used for work applications,  
18 they're also used for personal transportation,  
19 recreational vehicle activities, et cetera, so we felt  
20 like that was a reasonable representation.

21           Heavy duty vehicles is basically everything  
22 else, medium duty and on up through Class 8.

23           Let's focus on light duty vehicles for a start.  
24 We did an analysis looking at the Polk registration data  
25 for the last couple of years, from 2010 to 2012, and

1 found that diesel car registrations have increased  
2 nationwide by about 24 percent during this period.

3 Hybrid technology was up 33 percent. So, you  
4 can see the trends are quite significant for more people  
5 buying and using clean diesel cars here.

6 The breakdown shows you where they are; the  
7 total diesel population in the green line at the top,  
8 and the pickup trucks, and on down the list there.

9 In California, Californians are embracing new  
10 generation of clean diesel technology. Our analysis  
11 showed that California ranked number one nationwide for  
12 numbers of diesel vehicles registered last year.

13 And California also has the distinction as the  
14 fastest growing state for registration of new, clean  
15 diesel cars. So, clean diesel is definitely being  
16 embraced by Californians for its fuel-saving  
17 performance, and other attributes which we might cover  
18 in a moment.

19 Now, I'd like to turn to the research that we  
20 did, that's available now. We commissioned the Martec  
21 Group, based out of Michigan, this was an economic and  
22 market research consulting firm, to undertake a series  
23 of analyses for us and provide this information you're  
24 about to see.

25 The objectives on the light duty side were very

1 simple. First of all, we wanted to understand what fuel  
2 savings and CO2 benefits have already been achieved  
3 since 2005 for the introduction of the newer generation  
4 of clean diesel technology. What do those mean for  
5 California and nationwide?

6 Secondly, we wanted to look in the future. What  
7 are the potential further gains for clean diesel  
8 technology being used increasingly in passenger car  
9 applications? What does that mean in terms of fuel  
10 savings and CO2 benefits, both for California and the  
11 nation?

12 I should be clear, and then finally we wanted to  
13 take that analysis and look at what would happen if we  
14 used an increasing blend of biodiesel fuel in those  
15 vehicles.

16 And I should say that our benefits, and the way  
17 we're calculating this, so the fuel savings of diesel  
18 over gasoline. So, it's the conscious choice of a  
19 consumer to pick a diesel car instead of a gasoline car  
20 in this case of light duty.

21 So, let's get into the results. On a national  
22 basis the savings that have been achieved since 2005  
23 amount to about 1.2 billion gallons of fuel saved.

24 And you can see from this chart here the bulk of  
25 that has come from the heavy duty pickup trucks. Those



1 consumers who picked the heavy duty diesel engine option  
2 when they were in the dealership, looking at a  
3 Silverado, or one of the Ram trucks, or the heavy duty  
4 or Ford vehicles, they picked the diesel over the gas  
5 option. What did they save by doing that?

6 We've also got the number of models of vehicles  
7 across the bottom of the scale here, the X axis.  
8 Starting in 2005 there were only 11 choices, basically,  
9 for consumer. And at the end of the day, in 2012  
10 there's about 19. So, the number of choices is growing  
11 quite dramatically.

12 So what does that selection of diesel mean in  
13 terms of fuel savings and benefits? It translates, as I  
14 said, into about 1.2 billion gallons of gasoline, 29  
15 million barrels of crude. And this equivalent to  
16 basically taking 1.6 million vehicles off the road for a  
17 year, that's the volume of fuel savings that this very  
18 small kind of decision by people to buy diesel cars has  
19 impacted the transportation and energy system.

20 This also accounts for roughly 11 percent of the  
21 strategic petroleum reserve.

22 So, the choice to use clean diesel over gasoline  
23 can be quite powerful in terms of energy savings.

24 Let's take a look at what it means for  
25 California, specifically. So here in California,

1 looking at the same time frame, 2005 to 2012, the total  
2 savings for diesel vehicles, again the light duty  
3 vehicles being used in California, it's about 700,000  
4 tons of CO2 during that time frame, 110 million gallons  
5 of fuel saved.

6 So, quite impressive results and, again, the  
7 bulk of the savings are coming from the more -- the  
8 greater penetration of the heavy duty pickup trucks,  
9 primarily.

10 And we'll talk about what the future mix looks  
11 like there in just a moment.

12 We also looked at what does this mean for the  
13 individual consumer because that's been pointed out.  
14 It's great to have technologies that might produce  
15 benefits and might produce savings in the future.  
16 Diesel vehicles are producing those savings today for  
17 consumers, and that's why they're embracing them so  
18 dramatically.

19 So, the next three slides are just some examples  
20 of that. So, if you have a diesel car, on average  
21 you're filling up nine times less each year, and over a  
22 54-month period that's 40 fewer trips to the fueling  
23 station, dollar savings of about \$1,500 in a 54-month  
24 ownership.

25 Our baseline here is looking at gasoline at

1     \$3.59 a gallon, and diesel at \$3.85.

2             If you're buying a diesel option in a light duty  
3     SUV, you're looking at a carbon footprint reduction by  
4     about three and a half metric tons and a savings of  
5     about 860 gallons of fuel over a 54-month ownership  
6     period.

7             And finally, those in the heavy duty pickup  
8     truck space are saving the most, about \$5,600 in fuel  
9     costs over the 54-month ownership cycle, and 1,900  
10    gallons of fuel saved compared to a gasoline option.

11            So, that was the past on the savings on light  
12    duty diesel.

13            Let's look at the future. So, I'm going to  
14    start with a little bit of perspective about this.  
15    Obviously, the primary driver for that mix of fuels and  
16    technologies from a global basis are CO2 standards, and  
17    this chart represents where a number of those  
18    international trends are taking us, with the U.S.  
19    represented there in the darker lines and kind of the  
20    outer bound there.

21            And you can see that we're going to have some  
22    alignment with the European regulations later in the  
23    2020, 2021 time frame, I guess it is. And the  
24    European's, of course, have embraced diesel technology  
25    quite considerably over the last number of years.

1           In fact, beginning in 1998 there was a voluntary  
2   commitment by manufacturers in Europe to bring more  
3   diesel cars in as a result of their agreement to meet  
4   lower CO2 limits by 2012.

5           So, this introduced some advanced technology,  
6   such as high performance fuel injection technologies,  
7   and the widespread use and greater innovation in turbo  
8   charging.

9           So in Europe, for example in 2000, I guess 2010-  
10  11, the last line on this -- dot on this chart, more  
11  than half of consumers, when they bought a new vehicle,  
12  bought one with a diesel engine option.

13          Here in the U.S., you know, we're looking at  
14  about a 3 percent overall today of the total number of  
15  registrations.

16          But you can see in Europe diesel has been quite  
17  a strategy to reduce CO2 emissions.

18          Part of the success for the future of diesel  
19  depends on the choices of vehicles available. And today  
20  we have twice as many choices, basically, as we had in  
21  2000, and that number is going to go up quite  
22  dramatically. And we anticipate a more than doubling of  
23  the choices for consumers across the full range of  
24  vehicles, from passenger cars on up to the heavy duty  
25  trucks, SUVs, and some light pickup truck activity, as

1 well.

2           And just looking at the vehicles that are  
3 available today, you can see that some of these models  
4 are quite popular in the diesel version. For example,  
5 the Volkswagen Jetta, almost half of all Jetta's sold  
6 today are sold with a diesel engine option. And you can  
7 see the Passat also has quite high performance.

8           So, diesel market share on the left, the volume  
9 of those sales on the right, and the models on the X  
10 axis.

11           So, as more vehicles comes into the U.S., we're  
12 expecting to see more activity here. And, of course,  
13 these are the most popular models that are available  
14 today.

15           So let's look forward now about the future. We  
16 made some assumptions about what the market might do.  
17 We took -- we're not forecasters at the Diesel  
18 Technology Forum. There are a lot of people that are.

19           So, we took, I think, a reasonable approach. We  
20 had a conservative estimate of about 4 percent  
21 penetration of diesel vehicles.

22           Our baseline for this analysis and what you're  
23 going to hear my comments on going forward are for a 7  
24 percent scenario.

25           And then there's an aggressive scenario where by

1 2020 diesels represent 10 percent of the new light duty  
2 vehicle sales.

3           So, let's take a look at what this means. In  
4 California, those same assumptions apply, so that would  
5 mean about 130,000 new diesel sales per year here in the  
6 State by 2020.

7           So, in terms of fuel savings what does that  
8 level of penetration mean? And here you can see for  
9 California we're looking at a savings of anywhere from  
10 165 million to 240 million gallons of gasoline if we see  
11 that penetration of diesel cars over the next seven  
12 years.

13           The U.S. overall, I should point out, I didn't  
14 show the national slide here, but the savings, looking  
15 at that seven percent on a national basis is 1.3 to 2.1  
16 billion gallons of fuel saved. So, we're looking at it  
17 from a national perspective as well.

18           If we break that down further, in passenger cars  
19 you can see anywhere from 21 to 63 million gallons as  
20 more passenger car choices come into play.

21           If we look at the light truck component, we're  
22 looking at anywhere from 18 to 54 million gallons of  
23 gasoline saved.

24           And then if we looked at a national perspective  
25 about the use of biodiesel fuel we would see some

1 additional benefits of 150 to 300 million gallons of  
2 fuel displaced above and beyond these choices of diesel  
3 in these vehicles. So, biodiesel makes the diesel  
4 equation better in terms of fuel displacement and energy  
5 savings.

6           So just to summarize, and this is the national  
7 perspective here, we've talked about the savings going  
8 forward, as much as 1.2 billion gallons of gasoline.  
9 Conservative estimates in terms of the light duty  
10 vehicles there, about 7.7 million tons of CO2 and we can  
11 look at additional savings of 260 million gallons of  
12 gasoline for a B5 blend of biofuels in the diesel pool  
13 nationwide.

14           Now, I'd like to turn to heavy duty vehicles and  
15 finish our presentation this morning. And the remainder  
16 of the remarks will focus only on medium and heavy duty  
17 trucks, as I outlined in the beginning.

18           So, for the heavy duty part of this research we  
19 took a little bit different tactic. We wanted to  
20 understand the penetration of the new generation of  
21 clean diesel technology in the trucking population  
22 today.

23           And that means anything that's on the road  
24 that's 2007 and newer. That's an important year, as you  
25 know, from an emissions perspective and we felt like it

1 would be good to know how many vehicles out there are  
2 actually embracing and using this new generation of  
3 clean technology.

4 We did not do a market penetration look at this  
5 because diesels already power over 90 percent of all the  
6 commercial vehicles out there, and so market penetration  
7 issues for us were less of an interest.

8 And we wanted to also understand, of course, the  
9 air quality benefits, and the CO2 and fuel savings as a  
10 result of the use of this newest technology.

11 And then we give you some specific examples of  
12 some segments of the trucking world here at the end.

13 So, let's get into taking a look at the heavy  
14 duty benefits. Any discussion about heavy duty diesel  
15 trucks, particularly in California, must begin with a  
16 discussion about emissions. And the progress that's  
17 been made over the last decade plus is nothing less than  
18 dramatic.

19 In terms of the reductions, we're now at a level  
20 where diesels are near zero emissions and almost  
21 equivalent to the emissions from natural gas, which  
22 enjoys only a small, a very small advantage of NOx  
23 emissions.

24 And this is really quite an accomplishment with  
25 the industry, and the Air Resources Board, and EPA,



1 quite a cooperative journey that we've been on.

2 And we've got this great new technology that  
3 also is still very energy efficient. So, the question  
4 is how do we use that in the future?

5 Our analysis of the registration data and  
6 understanding what penetration is out there gave us some  
7 interesting findings. About 20 percent of the 2012  
8 fleet that's out there, so these are all trucks that are  
9 registered today, are powered with the new diesel  
10 engines built after 2006.

11 So, the trucking industry's replacing and  
12 upgrading their technology with the new low emissions  
13 and more fuel-efficient diesel engines as -- on a  
14 reasonably good rate.

15 Here in California, California ranks third  
16 nationwide in the percent of all diesel trucks that are  
17 2007 and later model year. And 2006, 2007 that's the  
18 time frame for ULSD nationwide and I think it's the  
19 same -- we're looking at the same reference point there.

20 So, California ranks third, so it's quite -- the  
21 new technology's being embraced here in California, as  
22 well, for the medium and heavy duty vehicles.

23 The technologies that have been deployed to meet  
24 these low emission requirements you're familiar with, I  
25 believe, and the blue band here represents the clean

1 diesel technology that's introduced back in the '07 time  
2 frame, primarily using exhaust gas recirculation,  
3 advanced emissions controls, particulate filters, et  
4 cetera, a lot of inside-the-cylinder work.

5 And, of course, our key for this is ultra-low  
6 sulfur diesel.

7 2010 saw the introduction of selective catalytic  
8 reduction, or SCR. SCR technology provides the ability  
9 to even get further gains in emissions and fuel savings  
10 for engines, as we'll see in a moment.

11 I want to point out that the end-use emission  
12 rates for the 2010 and later-year trucks have dropped by  
13 over 90 percent since 2007.

14 Because as we talk about making further gains in  
15 fuel efficiency and lower CO<sub>2</sub>, we cannot walk away from  
16 the need for continued improvements to clean air.

17 And continuing to meet very low NO<sub>x</sub> and near-  
18 zero emissions is critical for California. And sort of  
19 on the other side of town here they're still worried  
20 about meeting clean air standards for ozone and  
21 particulate.

22 So, these are some examples of what real-world,  
23 actual end-use emissions are looking like from a number  
24 of different categories of vehicles, different classes,  
25 from a Ford F450 on down to a Class 8 Freightliner

1 Cascadia.

2           So, you can see the dramatic reductions in NOx  
3 and PM emissions during that time frame, from 2007  
4 through 2010.

5           So, if we looked at the fuel savings and CO2  
6 benefits from the new technology and most of these  
7 benefits really start to apply to the 2010 and later  
8 model years because of the use of selective catalytic  
9 reduction technology, as I outlined earlier.

10           So, those vehicles, so far, have saved about 5  
11 million tons of CO2, and these are national numbers,  
12 about 5 million tons of CO2, 560 million gallons of  
13 fuel, and that's 13.3 million barrels of oil.

14           So, quite substantial savings already and we're  
15 only two years, now three years into the adoption of  
16 this new, advanced technology for heavy duty vehicles.

17           And in terms of emission benefits, while  
18 achieving those fuel economy gains they're also  
19 reducing, by about 1 million tons of NOx from the air,  
20 and this is quite significant, here for California,  
21 particularly.

22           To put all that in perspective, the 1.9 million  
23 heavy duty vehicles introduced from 2007 to 2012 have  
24 saved about 13.3 million barrels of crude on a national  
25 basis and a million tons of NOx.

1           And this is equivalent to taking 1.2 million  
2 light duty vehicles off the road for one year. And  
3 we've done some other interesting comparisons there.

4           Also, it is equivalent to removing the annual  
5 CO2 emissions from 1.6 coal-fired power plants.

6           So, the NOx reductions, and air quality benefits  
7 and CO2 benefits from the newest generation of diesel  
8 technology is significant and will continue to accrue as  
9 more of these vehicles hit the roads.

10          So, for the diesel buyer this is also  
11 significant. The trucker, of course, is worried about  
12 the bottom line, perhaps more than anyone. So, new  
13 clean diesel engines in Class A trucks are saving them  
14 about \$3,500 a year in fuel costs.

15          For a tractor driving 125,000 miles it's a  
16 savings of about 875 gallons of fuel. And the emission  
17 savings, as you can see there, outlined in this graph.

18          For a Class 7 vocational truck, savings of about  
19 3.1 tons of CO2 per year and other benefits that you see  
20 here, as well. That's 310 gallons and an additional  
21 \$1,200 savings at \$4-a-gallon diesel.

22          And finally, in the pickup and delivery space,  
23 these vehicles have achieved about a 20 times reduction  
24 in real-world NOx emissions with the newest generation  
25 of clean diesel technology.

1           So, California needs lower NOx technology and  
2 the clean diesel trucks are delivering that.

3           I would also want to point out that the industry  
4 is certainly not standing still when it comes to further  
5 improvements in air quality, and reductions in fuel  
6 economy and CO2.

7           As many of you know, EPA and NHTSA have hammered  
8 out an agreement to reduce by 6 to 23 percent fuel  
9 consumption from these vehicles beginning in 2013  
10 through 2018.

11           The manufacturers have already announced that  
12 they've generally met the initial phase one of that, and  
13 that's due to a combination of vehicles and -- excuse  
14 me, engine and vehicle technologies that were already  
15 available in many cases, or on the shelf that could be  
16 more widely deployed.

17           The second phase is getting more challenging, of  
18 course, as we look to get even further reductions in  
19 fuel economy, while not sacrificing NOx emissions.

20           And I think many of you in this room are  
21 familiar with that tradeoff. That the more that's done  
22 to lower emissions of NOx creates competing forces for  
23 getting greater fuel economy gains from the engine.

24           So, it's been a fine balancing act for over a  
25 decade and that gets far more complicated now going

1 forward.

2           And any further changes in NOx emissions will  
3 potentially challenge the ability to meet those future  
4 fuel economy targets outlined at the Federal level, and  
5 what you need here in California.

6           So, continuing to maintain a thoughtful balance  
7 between NOx and CO2 interest is going to be paramount  
8 going forward.

9           So to wrap up, let me just conclude by saying  
10 that the transformation of diesel to a low-emissions,  
11 clean technology, its significant penetration in the key  
12 sectors of California's economy, and its inherent energy  
13 efficiency, all three of those things position diesel to  
14 play a key role in meeting the future greenhouse gas and  
15 clean air objectives here in California.

16           There's significant fuel savings and benefits  
17 that are accruing today from existing clean diesel  
18 engines and have saved California more than 2 and a half  
19 million barrels of oil, and .7 million tons of CO2.

20           By using more diesel in passenger cars, light  
21 duty trucks, and SUVs we're going to see even further  
22 savings in the future.

23           On a national basis, these estimates looking  
24 forward could amount to about as much as 1.3 billion  
25 gallons of gasoline and with the use of biofuels, a

1 savings of 260 million gallons of gasoline above and  
2 beyond that.

3 On the heavy duty side we've just talked about  
4 the penetration of the new technology and what that  
5 means in terms of fuel savings.

6 For California, just to put a concluding point  
7 on it, we're looking at a savings of the light duty  
8 vehicles that has been achieved, about 1.2 billion  
9 gallons has been saved. The future looks like we could  
10 be saving anywhere from 165 million to 240 million  
11 additional gallons as more people invest in new clean  
12 diesel passenger cars, light trucks, and SUVs.

13 And we've got about a 21 percent penetration of  
14 the newest, most fuel-efficient, heavy duty clean diesel  
15 vehicles on the road today in California.

16 So, with that I'll just conclude by observations  
17 from others that are far more knowledgeable and study  
18 these issues, and their perspective about the future of  
19 diesel as a global transport fuel.

20 And I would call your attention, if you're  
21 looking for more details and interest about the light  
22 duty vehicles to check out the *New York Times* from two  
23 weeks ago. The Sunday edition had quite a dramatic  
24 portrayal of diesel cars. And the review there I think  
25 was quite informative.

1           So with that, thank you very much for the  
2 opportunity and we'll be happy to answer questions at  
3 the appropriate time.

4           COMMISSIONER MC ALLISTER: Thanks for that.  
5 That was really informative. In fact, my mother just  
6 recently bought a diesel Jetta, so we're on trend, I  
7 guess.

8           Let's see, so clearly a lot of benefits. I  
9 guess, you know, I'm interested in the next panel that's  
10 going to talk about biofuels because I think that's a  
11 really key component here. Because when you start  
12 counting the molecules and you look forward, you know,  
13 it's not clear. You know, clearly, we have to make a  
14 wholesale kind of transition over to more renewable  
15 fuels for whatever engines, but particularly for diesel  
16 engines.

17           And so I guess I, personally, am interested in  
18 hearing about kind of the potential for lock in into  
19 technologies, and then sort of how much risk that  
20 produces for us down the road if, you know, scenarios  
21 kind of evolve in the direction where there's not enough  
22 biofuel and we sort of have these vehicles.

23           Presumably, their life isn't forever so, you  
24 know, eventually we could still jump tracks if we had  
25 to.



1           But I guess, you know, the interactions between  
2 all of these different vehicle types, so maybe you could  
3 just comment at a very high level on that.

4           MR. SCHAEFFER:   Sure.

5           COMMISSIONER MC ALLISTER:   I think probably  
6 we'll get into that a little bit later, as well.

7           MR. SCHAEFFER:   Sure, just the diesel industry  
8 embraces the use of higher blends of high quality,  
9 renewable biodiesel fuels.

10           If you look at manufacturers today, pretty much  
11 all of the light duty companies are comfortable with a  
12 blend of B5, with some now allowing a blend of B20.

13           The newest one of those is the Chevrolet Cruze  
14 which is certified up to a B20 blend.

15           All the heavy duty pickup trucks that we pointed  
16 out here in this study, they can all use the B20 without  
17 any problems.

18           I think going forward to higher blends in other  
19 passenger cars, we need to be mindful of the issues of  
20 the durability of the emissions control technology and  
21 assuring that we have a high quality stream of biofuels  
22 that can interact favorably with those systems.

23           Because remember, the biodiesel can be used in  
24 any diesel vehicle that's out there today in these lower  
25 blends. So, it has great appeal because of the broad

1 generation of diesel, you can get very quick savings and  
2 CO2 reduction from larger uses of biodiesel, even at  
3 lower percentage blends.

4 The higher percentage blends are coming in some  
5 places. In some parts of the country B20 is more  
6 available than others.

7 But, certainly, the industry welcomes the use of  
8 more high quality renewable biodiesel blends in its  
9 products.

10 COMMISSIONER MC ALLISTER: Great, thank you very  
11 much.

12 MR. SCHAEFFER: Thank you.

13 COMMISSIONER SCOTT: I did have a question.  
14 That was a great presentation, thank you very much.

15 The question, I know your focus here was on the  
16 on-road sector. I know the non-road sector is also a  
17 large component of a lot of this. And I was wondering,  
18 I was interested especially in some of your summary  
19 slides where the trend of having, you know, like 20  
20 percent of the fleet is now powered with the newer  
21 engines, or 11 percent of all the on-highway diesel  
22 engines have been built -- that are out there right now  
23 were the ones built after 2010.

24 And do you expect to see sort of that same sort  
25 of trend as the non-road engines transition to their

1 newer, cleaner standards?

2 MR. SCHAEFFER: Yes, thank you for that  
3 question. The uptake, the adoption of newer generation  
4 clean diesel technology in the off-road machine segment,  
5 from a regulatory perspective has been following a time  
6 line that is lagged a little bit by the on-road folks.

7 Starting January 21st, next year, 2014, the  
8 largest engines will meet the tier 4 final regulations  
9 for the same kind of near zero NOx and PM levels that  
10 we've seen shown in the on-road sector.

11 The acquisition, and the uptake, and the use of  
12 those in the population is really dependent on factors  
13 such as economic stability and growth. And certainly,  
14 as construction starts to pick up, as our economy starts  
15 to recover more people will be buying construction and  
16 farm equipment to improve their operations, and they'll  
17 see the fuel saving gains come out of that as well.

18 We actually are undertaking a project to get at  
19 this question. It's a much more complicated question  
20 because we do not have the registration data available  
21 and the populations are somewhat uncertain.

22 And as the Air Resources Board and others have  
23 learned here in California, they're not necessarily  
24 always what you think they are in terms of how many  
25 vehicles are out there, but also how those machines and

1 equipment are actually operating.

2           So, we are hoping to look at that circumstance  
3 of how many machines, equipment, engines, et cetera in  
4 the off-road space are using the newer generation of  
5 clean technology, which is taking a little longer and is  
6 going to be -- going to give us not quite as good of a  
7 broad level of information, but we should have some  
8 answers on that before the end of the year.

9           Thank you.

10           COMMISSIONER MC ALLISTER: All right, thanks  
11 very much.

12           MR. OLSON: Okay, so Commissioners, we're going  
13 to go into kind of a grouping of topics under biofuels  
14 and to begin that we've asked Mary Solecki from  
15 Environmental Entrepreneurs to discuss advanced  
16 biofuels.

17           Just a note, she also has a travel constraint  
18 and will have to leave by 11:00. So, if you have  
19 questions for her, please provide them at the end of her  
20 presentation.

21           So, Mary Solecki.

22           MS. SOLECKI: Thanks Tim, and good morning  
23 Commissioners. Thank you for reordering the agenda a  
24 little bit for me this morning, for my considerations.

25           I would like to thank everybody here for -- I

1 came here in my Jetta TDI, powered with a B20 blend from  
2 Propel Fuels. So, directly thank you to everybody who  
3 made my transportation option possible, and for reducing  
4 my emissions. I did carpool as well, for what it's  
5 worth.

6 COMMISSIONER MC ALLISTER: This is the future  
7 we're headed into, right. It's a guilt --  
8 transportation becomes a guilt trip, right, yeah,  
9 absolutely.

10 (Laughter)

11 MS. SOLECKI: So, I was glad to see that I was  
12 so up on a trend there, that's great.

13 E2 is a nonprofit organization. We're a  
14 membership-based advocacy group. And lately we have  
15 been taking quite a foray into some independent  
16 analysis, especially on the topic of advanced biofuels.

17 And that's what brings me here today is to talk  
18 to you about the analysis and the research that we've  
19 been conducting on advanced biofuels.

20 We are currently working on the update to our  
21 annual Biofuel Market Report. And in this report we  
22 specifically study, so I can set the scope properly,  
23 advanced biofuels that have a 50 percent reduction of  
24 carbon or greater.

25 So, in the past we used a somewhat confusing

1 series of definitions that was more environmentally  
2 conservative. We blended a California definition with  
3 EPA. This year we're just using an EPA definition. And  
4 so, soybean-based biodiesel will fall under the scope of  
5 our review this year.

6 And so we're in the process of finalizing these  
7 numbers right now and so there's, unfortunately, a lot  
8 of information I'm not quite ready to put in front of  
9 you in black and white this morning, but I can at least  
10 talk to you about a lot of the trends that we're seeing,  
11 and I can provide some specific examples of the status  
12 of some of the companies that we've been looking at.

13 And as much as I can provide these  
14 generalizations, there are exceptions to every one of  
15 these generalizations that I'll make. So, I'm sure that  
16 any company could raise their hands and say what she  
17 said isn't true for my company, in particular. So, just  
18 have to make that disclaimer.

19 I can also provide more detail to you in a one-  
20 off basis, but we'll be publishing our report no later  
21 than August 27th, at the Low Carbon Fuel Summit that  
22 will be here in town. So, we look forward to sharing  
23 that information with you all then and there.

24 All right, as far as a sneak peak, what we're  
25 finding, overall the advanced biofuel sector is

1 experiencing slow, but steady growth.

2 As a whole, a lot of the new technologies have  
3 proven themselves at a demonstration scale and now  
4 they're looking to take that next step into commercial  
5 production.

6 And that's the step that requires significant  
7 capital. And so they're having huge barriers in  
8 relation to raising that amount of capital needed for  
9 the new bio-refineries.

10 And so that's the step that the advanced biofuel  
11 industry generally is facing at the moment. And in my  
12 last presentation here, to the Energy Commission, I  
13 talked a little bit more in detail about the different,  
14 unique approaches that each company is taking to meeting  
15 these barriers.

16 The drivers of this growth are policy-driven  
17 demand through the RFS and the LCFS, and through  
18 customer demand from sources like the military and the  
19 airlines.

20 Regulatory certainty continues to be a huge  
21 barrier for this group. Both the RFS and less so the  
22 LCFS, lately, but the RFS is certainly under significant  
23 scrutiny at a Federal level as it's going before the  
24 Energy and Commerce Committee, and others for review  
25 this year.

1           There's a little bit of text in the latter half  
2 of the slide that, embarrassingly, shouldn't be there.  
3 That's what I get for making this presentation late on a  
4 Sunday. I apologize, that's left over from my last  
5 presentation to you all. Please excuse that.

6           Anyhow, as far as private investments, like I  
7 said the capital flow seems to be the big clutch here.  
8 And we are seeing big capital flow, that's the good  
9 news.

10           Last year we found \$3.4 billion had been  
11 invested in this market about this same time. This year  
12 it's up to about \$4.5 billion. I intentionally didn't  
13 put the total there in black and white for you because  
14 that number may adjust a little bit.

15           We're tracking companies that are active and are  
16 in North America. So, if a company has since filed  
17 Chapter 11 or anything of that nature, then we're no  
18 longer tracking that investment. So, this is just  
19 active investments.

20           And then the advanced biofuel production is  
21 really only half the story because the value chain is so  
22 important, the feedstocks, the enzymes, the distribution  
23 equipment and technology.

24           And so there's significant investment going on  
25 in this market as well, and that's totaling about \$2.1



1 billion since 2007.

2           If you total these two together, that gives you  
3 about \$6.6 billion since 2007, so in the last six years  
4 if I'm counting properly, seven years.

5           To review where we were last year, we were  
6 tracking 163 companies and they had a capacity last year  
7 of about 685 million gallons.

8           We were projecting that that was going to grow  
9 to about 1.6 to 2.6 billion gallons, that's our low and  
10 high end assessment of what the capacity might be in  
11 2015.

12           And what we're finding is that that number was  
13 more or less on track. I'll get into that a little bit  
14 more in a moment.

15           But the number of companies that are still  
16 active in the market is almost completely steady since  
17 last year. We've got some additional biodiesel  
18 companies that we're now tracking, like I said because  
19 we integrated the soybean-based biodiesel because we're  
20 using the EPA definition, and they do qualify as a 50  
21 percent reduction or better.

22           And so for that reason we're now tracking 202  
23 companies. But other than that, for any company that  
24 was merged, or acquired, or filed a Chapter 11 there is  
25 another company that came into -- that not only came

1 into the public view, but made significant commercial  
2 plans or announcements this year.

3 So, for every failure this year I can meet it  
4 with a success story as well, so I found that  
5 interesting.

6 I'll spend a little bit more time on this slide  
7 and this is where I can describe some more of the  
8 anecdotes that we've seen.

9 Even though there's only percentages right here  
10 because, like I said, I didn't want to necessarily put  
11 our final numbers in black and white quite yet, they're  
12 still subject to a little bit of tinkering.

13 But in 2000 -- this year what we're looking at  
14 is about a 12 percent growth in capacity from last year.  
15 And our numbers for 2015 that was 1.6 to 2.6 billion  
16 last year, we've narrowed that a little bit further.  
17 Now, we're looking at about 2 to 2.4 billion gallons of  
18 capacity in 2015 and a little bit more in 2016.

19 In 2016 the lion's share is going to be  
20 biodiesel, it's going to be about 1.8 billion gallons.  
21 That's just a little bit less than what the EPA will be  
22 calling for -- or the RFS will be calling for because of  
23 the share of renewable diesel that will be falling under  
24 there.

25 What's interesting is the growth of the

1 hydrocarbons, the renewable diesel and the renewable  
2 gasoline, that's outpacing the growth of the cellulosic  
3 ethanol, from what I can see.

4 I think this part is pretty interesting that by  
5 2016 we're looking at about an equal market share right  
6 there. That's about 620 million gallons for each one of  
7 those types.

8 We're not tracking the corn ethanol, this is  
9 just cellulosic ethanol.

10 And what happens with the cellulosic ethanol is  
11 that there's going to be a few facilities coming online.  
12 We've got the Eneos -- at least across the country  
13 there's the Eneos Plant, DuPont and Abengoa. Those  
14 should be coming online in the next couple of years.

15 And then within California we've got the Canergy  
16 Plant that was announced and Edeniq is reporting about 7  
17 million gallons of cellulosic ethanol.

18 But the big trend that's happening there is I  
19 think that we're going to see fewer brand-new facilities  
20 being built and it's going to be a lot of conversion of  
21 existing capacity.

22 There's processes like the Edeniq and the  
23 Sweetwater technologies. Others are providing some --  
24 Bolton is a little too simplistic, but they allow them  
25 to process more than just the corn feed stock, but to

1 accept a variety of cellulosic materials, and it's at a  
2 pretty low capital requirement in comparison to building  
3 an entire facility.

4 An entire facility can run about \$150 to \$200  
5 million, but some of these advanced technologies just  
6 require in the range of \$15 million.

7 So, it's a much easier way to take existing  
8 capacity and be able to lower the carbon intensity  
9 score.

10 And we're not tracking very many of those  
11 because a lot of that information hasn't been announced  
12 in great detail, yet.

13 And so it's possible that that ethanol number  
14 could go a lot higher, because if those technologies  
15 prove to be viable, the way they suspect right now, I  
16 think that that would be -- that that could grow  
17 gangbusters over the next few years for the corn ethanol  
18 market.

19 The hydrocarbons, as we've discussed a little  
20 bit here this morning, since they are -- they face fewer  
21 of the blending and pipeline infrastructure issues; they  
22 do have some barriers as far as some certifications.  
23 There is a lot of interesting growth happening in that  
24 sector.

25 KIOR, even though KIOR's currently producing

1 ethanol today, they're going to be doing some of these  
2 renewable hydrocarbons in Mississippi.

3           Neste is importing about 100 million gallons  
4 this year, 300 million gallons in 2013 and 2014. They  
5 have reported that that's about 2.5 million metric tons  
6 of reduction, which is 45 percent of the LCFS this year  
7 and next year, which is pretty impressive.

8           Sapphire is doing some interesting things and  
9 I'm watching them closely to see what happens next with  
10 their capacity in New Mexico. But they're a California-  
11 based company and I think that they've got some  
12 interesting technology with their green crude that  
13 they're selling to Tesoro.

14           Some other hydrocarbon-based companies are  
15 Diamond Green and Emerald Biofuels, both in Louisiana.  
16 If you can keep the gemstones straight there, Diamond  
17 Green is a JV of Valero and Darling, and they're going  
18 to be producing about 140 million gallons of renewable  
19 diesel.

20           And so the way that they're overcoming that  
21 capital need is they've got significant backing through  
22 Valero and Darling.

23           And then there's Emerald Biofuels. They've got  
24 about 85 million gallons of capacity from Dow and  
25 Honeywell.

1           There was also an announcement this year for  
2   Altair. They're going to be producing -- they'll be  
3   coming online as early as next year with about 5 million  
4   gallons in Los Angeles. They're using the old Paramount  
5   facility, and it's an idle refinery. They'll be  
6   repurposing it. And over the next few years they're be  
7   scaling it up to about 30 million gallons.

8           So, 15 of that 30 million will be going to  
9   United Airlines. The other 15 will be sold into the --  
10   I imagine into the California market. Maybe they'll  
11   decide to export it, but I doubt it.

12           And then there's the Dynamic facility that's  
13   in -- I'm lapsing, where's the Dynamic facility? It's  
14   in Louisiana, as well, I believe. And it's 75 million  
15   gallons. It's been online for a few years, now.

16           Finally, as far as that other number, Oberon  
17   Fuels has made some announcements about making renewable  
18   DME and they're looking at in-state production of that  
19   DME from biomethane and other natural gases.

20           So, that's a -- I'm sorry I don't have more of  
21   that written down for you, but I think that there's a  
22   lot of interesting things and companies that are  
23   happening within this market. And I'm happy to provide  
24   more detail on an individual basis, or after the  
25   presentation.

1           So, that's pretty much all I have for you this  
2 morning. I hope that was a helpful overview of the  
3 updates. And if you have any questions, I suppose now  
4 is the time since I'm taking off before too long. I'll  
5 be here for another half-hour or so.

6           COMMISSIONER SCOTT: I did have one, which was  
7 on your 2012 report review, and you had sort of the high  
8 and low scenarios, but biodiesel was the same across the  
9 high and low, what is that?

10          MS. SOLECKI: Yeah, that -- thanks for asking  
11 about that, actually. So, biodiesel, the capacity is  
12 much greater than that number that we're reporting right  
13 there. Their capacity is up, it's anywhere between 2.1  
14 and 2.5 billion gallons, but their actual production is  
15 much lower.

16          Did I say that correctly, capacity is at -- okay  
17 and the production is much lower.

18          And so we didn't put the -- report their actual  
19 capacity because they're producing at this 877 million  
20 gallons in 2012 and that was excluding the soybean-based  
21 biodiesel last year. The total biodiesel number was  
22 greater.

23          Ryan can provide a little bit more detail there.  
24 And, in fact, Russ and Joe might be planning on doing  
25 that in a later presentation.

1           So, that one is a little bit of an anomaly and  
2   that's why it's not actually a low and a high. The  
3   actual production was at 877, so we didn't feel a need  
4   to have a variance there.

5           COMMISSIONER SCOTT: Thank you.

6           MS. SOLECKI: Okay.

7           COMMISSIONER MC ALLISTER: I just want to  
8   compliment E2 for all the work you do in this space,  
9   really a nice, nice job.

10          MR. OLSON: So, Commissioners, just another  
11   point here. When we recruited speakers, we were looking  
12   for people who could represent a whole range of  
13   companies and otherwise we'd need a three-day workshop,  
14   there was that much interest.

15          And we will try to itemize this in our analysis  
16   of our -- we are doing a lot of one-on-one meetings and  
17   interviews with other -- individual companies, too, so  
18   making sure we're not leaving people out.

19          We're pleased to have our next speaker, Plinio  
20   Nastari, join us from Brazil via WebEx. He is the  
21   President of Datagro Consulting, gathers information for  
22   multiple clients, including the government of Brazil,  
23   also worldwide organizations. He's an advisor to the  
24   government of Brazil.

25          And by the way, he organizes some of the best



1 conferences on these topics in New York, Sao Paolo, and  
2 other places.

3 And he's an expert on alcohol fuel, specifically  
4 sugarcane ethanol and that's what we're asking him to  
5 speak about today.

6 So, Plinio, if you're on the line you can go  
7 ahead and start your presentation.

8 MR. NASTARI: Everyone can you hear me?

9 MR. OLSON: Yes, we can.

10 MR. NASTARI: Commissioners -- thank you -- CEC  
11 staff, participants, thank you for the introduction  
12 about Datagro that saves time.

13 Just to complement the information already  
14 given, we provide services to 41 countries, clients in  
15 41 countries. We're a team of 85 people spread in six  
16 offices, including one in New York.

17 And we have been involved not only with market  
18 analysis and independent research, but also in trade  
19 negotiations and trade disputes at the ITC, and  
20 arbitrations in Brazil, and the ICC in Paris.

21 We have 11 business units, which is what we show  
22 here, and each one of these business units is involved  
23 with different aspects of the business and services that  
24 we provide.

25 We are going to be talking about Brazil. And

1 just to make a reference of what Brazil stands today,  
2 taking note of data from 2012 Brazil accounts for 35  
3 percent, approximately, of world's cane production.  
4 It's number one sugar producer. It's number two ethanol  
5 producer, second to the U.S., number one sugar and  
6 ethanol exporter.

7 And the Brazil has been able to achieve this  
8 market share with only 36 percent of its cane converted  
9 to exported sugar and 6.8 percent of its cane to export  
10 ethanol. And that's why it is such an important  
11 fundament to the world's sugar and ethanol markets.

12 In terms of energy, sugar cane is second largest  
13 source of primary energy in Brazil, 17 percent after oil  
14 and above hydropower. This cane production has grown  
15 after intensification of the diversification of  
16 production towards ethanol in the mid-seventies.

17 Now, another diversification process is underway  
18 from the use of bagasse and leaves for power, second gen  
19 ethanol and biogas, which is picking up strongly here.

20 And in these past four years the industry has  
21 suffered from the financial crisis of 2008 adverse  
22 climate, which reduced ag yields in recent years.

23 The feedstock gap you have, which existed until  
24 recently of 130 million tons of cane has been eliminated  
25 this year and now we see Brazil positioned to continue

1     expanding production.

2             We're estimating cane crush to grow in ten years  
3     to 1.06 billion tons.

4             This graph shows the evolution of supply of  
5     total reducing sugars from Brazil since 1975, when this  
6     diversification process is started. It shows sugar,  
7     anhydrous ethanol, and hydrous ethanol used by the flex  
8     fleet, in total reducing sugar's equivalent. And it  
9     shows how it grew from 7.1 to nearly 86 million tons  
10    this year.

11            Just to have an idea of what 86 million tons  
12    represent, global sugar consumption worldwide is 166  
13    million tons.

14            The gap, the feedstock gap which has been  
15    closed, is shown in this graph. You can see the gap in  
16    '11-'12 and '12-'13. And this is cane supplying the  
17    Centre-South region, which accounts for more than 90  
18    percent of Brazil's supply.

19            The substitution of gasoline which has been  
20    achieved in Brazil from these figures is very large.  
21    You can see from this slide that since '85 cane  
22    production rose 8.3 times. Supply of total sugars 11  
23    times. And the production of sugar 5.2 times, while the  
24    production of ethanol rose nearly 50 times.

25            Since 2003, when the flex car sales started,

1 cane crushing rose from 358 to 634 million tons, nearly  
2 double. And sugar production rose 63 percent, while  
3 ethanol production rose 88 percent.

4 I trust that this information is going to be  
5 shared and available to participants later on.

6 In terms of substitution of Otto-cycle fuel  
7 demand, Brazil has been able to substitute nearly 45  
8 percent of its gasoline by ethanol in gasoline  
9 equivalent. And this graph shows the relative targets  
10 in the U.S. The RFS2 target 20 percent by 2022, and the  
11 EU Renewable Energy Directive 10 percent, which is now  
12 eventually coming down to 5 by 2020, and how the U.S.  
13 and Europe have fared in terms of reaching those  
14 objectives so far.

15 Since 1975, Ethanol has substituted in Brazil  
16 2.3 billion barrels of gasoline, a very relevant number  
17 considering the proven reserves of oil and condensates,  
18 including the Pre-Salt, which are today standing at 15.3  
19 billion barrels.

20 This is a number which is growing by 120 million  
21 barrels every year without additional investment, simply  
22 because cane is renewable.

23 And the value of this gasoline which has been  
24 substituted, including the foregone debt, the service on  
25 the foregone debt which has been saved is nearly \$280

1 billion, which is about 75 percent of Brazil's current  
2 foreign reserves, which is credited to be one of the  
3 reasons for the economic stability of Brazil.

4 In the past four years the issues affecting the  
5 industry have been the change in production systems  
6 from, basically, manual to mechanical planting and  
7 harvesting, which in the short term have brought higher  
8 losses, a need of greater investments, and higher costs  
9 in the short term due to climate problems.

10 A large cane planting effort is underway, which  
11 has shown as been achieved.

12 And the production has been impacted by unusual  
13 climate, which is now coming back to normal this year,  
14 2013.

15 And these pictures show, essentially, the old  
16 methods of planting and harvesting and how the industry  
17 has moved quickly into mechanical planting and  
18 harvesting. And in the Centre-South region we are  
19 moving close to 87 percent mechanical harvesting  
20 already. By 2014 it should be completed, the peripheral  
21 being achieved for a complete substitution of manual  
22 harvest.

23 180 plants in Brazil are already accredited by  
24 the USEPA as suppliers of Advanced Bioethanol, out of  
25 441, and 28 installations are certified by Bonsucro,

1 supplying ethanol and sugar to the EU. There are only  
2 two other plants in Australia, besides these 28 in  
3 Brazil, certified by Bonsucro.

4           A very interesting point is that cane ethanol  
5 functions in a closed circuit of soil nutrients. The  
6 only thing which has been exported by the mills are  
7 carbohydrates, the sugar and ethanol, which are  
8 molecules with atoms of carbon and hydrogen. So, all  
9 other chemicals, chemical elements such as nitrogen,  
10 phosphorous, potash, calcium, magnesium, sulfur and  
11 other micronutrients are recycle thru the byproducts,  
12 vinasse, ash, filter cake, which are returned to the  
13 soil.

14           And this build-up of material is what makes cane  
15 build up soil over time, which is a very important  
16 factor for sustainability.

17           the industry's moving towards the economic use  
18 of tops and leaves and by doing that will enlarge  
19 production and income from the same production days.  
20 One of the methods of showing that is the potential for  
21 cogen from bagasse. This potential is very large in the  
22 southeast of Brazil; it's close to 20,000 megawatts.

23           Just to have an idea, the average energy  
24 consumption in Brazil is 53,000 megawatts, average.

25           And you can see in the other regions. And it's

1 exactly located in the areas which are more densely  
2 populated, where energy is consumed.

3           The relevant fact is that mills are currently  
4 using efficiently only one-third of the energy in cane,  
5 the sucrose bar. Bagasse is being used inefficiently in  
6 tops and leaves and until recently were wasted.

7           And the industry is now in the process of  
8 utilizing bagasse and leaves more efficiently for power,  
9 for second gen ethanol, and also for biogas.

10           And studies developed by the University of San  
11 Paolo show that the biogas production has a huge  
12 potential impact since the production of biogas in  
13 formation into biomethane or green natural gas for  
14 substitution of diesel could be very effective. Only 50  
15 percent of the leaves being diverted to biogas would  
16 mean enough biogas and biomethane that only 5 percent of  
17 this biomethane would be enough to substitute all diesel  
18 use by the entire sugar and ethanol sector.

19           And this would bring the savings in greenhouse  
20 gas emissions close to 98.5 percent, according to this  
21 study at the University of San Paolo.

22           We know that sugarcane ethanol is a very good  
23 way of saving greenhouse gas emissions. According to  
24 the Brazilian scientific studies, it's 90 percent and  
25 over savings.

1           According to the EU read, without iLUC, 71, and  
2   the RFS EPA study, including iLUC 61, and it could be  
3   91. And this study from the University of San Paolo  
4   indicates that it could got to 98.5.

5           The projected demand for cane that we have until  
6   2023, using conservative assumptions on the potential  
7   expansion of sugar and ethanol indicates that the  
8   markets will continue asking for more products.

9           So, considering 20 percent usage of hydrous  
10   ethanol in flex fleet, and a stable market share for  
11   Brazilian sugar exports, we have this projection of 1.06  
12   billion tons of cane in ten years, which we see that can  
13   be met by all of the initiatives of not only new plants,  
14   but also better use of cane residues as they stand  
15   today.

16           The forecast for Brazil's sugar and ethanol  
17   demand is show here in a summarized way, in million tons  
18   of total reducing sugars. And ethanol exports is in  
19   light blue there.

20           And the proportion of exports of sugar and  
21   ethanol in total production, as a percentage of total  
22   reducing sugars, is shown in this slide.

23           And you can see that ethanol exports as a  
24   percentage of total production has risen from 1 percent  
25   in 2000 to 11 percent in 2008. It has fallen to 7.8



1 percent in 2013, and it's projected to reach 14.7  
2 percent by 2023.

3 Exports of sugar and ethanol accounting for,  
4 combined, for 18 percent of production by 2000, 42.9  
5 percent this year, and are projected to grow modestly to  
6 44.6 percent in ten years.

7 We are projecting total reducing sugars to reach  
8 150.8 million tons by 2023 from the current level of  
9 85.7. You can see what they were in 2000, 37.2.

10 Sugar cane for sugar and ethanol rising from the  
11 current 634 to 1.06 billion tons.

12 And ethanol exports, this is the historic in  
13 2000, 2005, 2013 estimate, and the estimate that we have  
14 for 2023, in million cubic meters.

15 Mr. Olson advised me that we should make a  
16 reference of the conversion factors between cubic meter  
17 and gallons, and here they are. So, 1 cubic meter is  
18 1,000 liters. One U.S. gallon is 3.7 liters. So, 1  
19 cubic meter is 264.17 gallons.

20 Well, with that the potential ethanol exports  
21 that we are projecting for the next ten years is  
22 3,000 -- or 3.48 billion gallons by 2023, from the 1.35  
23 billion gallons in 2005, and 1.08 billion gallons this  
24 year.

25 We see that bioethanol is being priced at a

1 price which is lower than what it should. It should be  
2 referenced to the price of toluene, not the price of  
3 gasoline.

4           Ethanol has characteristics as a fuel that --  
5 and a few additive that should be compared to toluene,  
6 not gasoline.

7           And the fact is that toluene has a market price  
8 which is between 30 and 45 percent higher than the price  
9 of gasoline, depending on the market and the time series  
10 length.

11           And in our view regulation that recognizes the  
12 environmental benefit of ethanol only internalizes in  
13 market prices and have the opportunity of doing it --  
14 internalizing market price in the inherent value of  
15 ethanol as fuel.

16           And if that happens, the share of total  
17 exportable surplus dedicated to ethanol could rise  
18 towards more ethanol as sugar in the future.

19           And this slide shows the evolution of the price  
20 of toluene and gasoline in Rotterdam and in the U.S.,  
21 showing the premium of 30 percent in Rotterdam and 45  
22 percent in the U.S. in the ag series that have been  
23 analyzed.

24           Brazil has been a major exporter of ethanol to  
25 the U.S. In this table we show Brazilian exports to the

1 U.S. since 2003, the last ten years. And you can see  
2 that, you know, it's a very stable flow. It changes a  
3 lot over time. And we can see that it's because the  
4 imports of ethanol from all origins into the U.S. has  
5 been changing a lot over time, which is the second  
6 column in this table.

7 And you can see also imports from all origins to  
8 California in the last column.

9 Here we are showing exports from Brazil, from  
10 CBI to California in the last ten years. And you can  
11 see that combining direct Brazil and CBI exports into  
12 California, and CBI ethanol is mostly hydrous ethanol  
13 from Brazil, reprocessed into CBI, you can see that  
14 Brazil plus CBI to California is pretty much the sum of  
15 all origins to California.

16 So, California's being supplied by Brazilian  
17 ethanol direct or indirectly through the CBI over time.

18 We can see that these projections, they are  
19 justified by the land availability. Today cane occupies  
20 9.8 million hectares after 65 million hectares possible  
21 for cane, according to the agroecological zoning, which  
22 was carried by the Brazilian government.

23 Cane does not grow in the Amazon region. It  
24 does not grow in the Pantanal area. And the government  
25 had the trouble of doing this agroecological zoning and

1 decided to prohibit the plantation of cane in areas  
2 which is not authorized.

3 But, really, there's nearly zero cane in De Bio  
4 Mos, which are protected, which is the Amazon and this  
5 land of Pantanal.

6 And the potential estimating by the zoning, 65  
7 million tons -- million hectores, out of the 9.8 million  
8 hectores which are currently in use.

9 If we look at the land used in Brazil, and  
10 Brazil has a total area of 851 million hectores, native  
11 vegetation is 554, which is 65 percent of the territory.  
12 Land in actual use is 260 mil hectores, and other uses,  
13 which is roads, cities, 38 million hectores.

14 Well, you can see that what is being used, 260,  
15 200 is pastures, crop land is 60, cane is 9.5, 9.8 out  
16 of these 60. And cane for ethanol is 4.6, which is half  
17 a percent of the land.

18 The growth which has been observed in area is  
19 basically coming from pasture, as you can see in this  
20 slide. And the fact that each hector of cane can bring  
21 together one-sixth of a hector for food production into  
22 cropping, and this is supported by research and surveys  
23 which are being done here very carefully.

24 The issue of whether the fact that Brazil's cane  
25 is subsuming pasture is forcing cattle to go into the

1   protected biome falls off this argument when we look at  
2   what is happening with pasture area, and you can see  
3   that pasture area is all actually falling, while the  
4   herd is growing, and meat production is growing.

5               So, the pasture area is falling by minus .14  
6   percent, while the herd is growing by nearly 1 percent  
7   per year, and meat production is growing by 2.64  
8   percent. Essentially, productivity in cattle raising  
9   from pasture is improving a lot and so the argument that  
10   the displacement of pasture by cane is forcing pasture  
11   into the Amazon is not true.

12              The final demonstration of this comes from the  
13   observation that the deforestation rate of the Amazon  
14   has fallen by 83 percent, while shrinking areas has  
15   continued to expand in pasture.

16              In the past 38 years agroindustrial yield in  
17   this industry has risen threefold, but the potential is  
18   to double until the end of the decade, and quintuple in  
19   the long run. This is the actual agroindustrial use  
20   curve. It moved from 2,000 liters per hector to 7,100  
21   liters this year, a rate of increase of 3.36 percent per  
22   year.

23              And the potential is for it to go beyond 30,000  
24   liters per hector by 2030.

25              The final message, well, investments tend to

1 concentrate on increased energy efficiency, cost  
2 reduction measures. The industry is changing rapidly  
3 with investments in mechanization and more efficient  
4 transportation infrastructure in rail and pipeline.

5 The supply of sugar and ethanol will grow from  
6 large stock of productivity to be implemented in the use  
7 of cane residues until recently have been wasted or  
8 burned.

9 We see ethanol is still being underpriced for  
10 its superior qualities as fuel. And regulations should  
11 aim at internalizing enterprise of these positive  
12 externalities.

13 There's a large area available for expansion of  
14 cane in Brazil and other cane-producing countries. And  
15 we see as Brazil as serving as demonstration, in fact,  
16 for initiatives in other places, like Columbia, Peru,  
17 Paraguay, Argentina, Dominican Republic, El Salvador,  
18 India, Thailand, Angola, Tanzania, Zambia, and others  
19 which will soon be participating in an enlarged world  
20 ethanol market.

21 And, actually, we are helping some of these  
22 countries, helping them establish their regulations and  
23 choice of technology to do that.

24 So, thank you very much, that's the closing.  
25 These are some of the agenda of our future conferences,

1 if you are interested.

2 MR. OLSON: Thank you very much, Plinio. And if  
3 some of us in the room didn't have all of your slides,  
4 if you're willing to give us your updated Power Point  
5 that would be beneficial, if you can e-mail that to us.

6 MR. NASTARI: Sure.

7 MR. OLSON: So at this point, Commissioners, you  
8 have questions?

9 COMMISSIONER SCOTT: I do have one question.  
10 Thank you very much for calling in and giving us this  
11 great presentation over WebEx.

12 The question I had for you, this is Commissioner  
13 Janea Scott, is on a slide kind of in the middle of your  
14 presentation where you mention that Brazil is the major  
15 exporter of ethanol to the U.S. And then it shows the  
16 fluctuation of the amounts of ethanol that have come to  
17 the U.S. from Brazil.

18 And I remember at the beginning of your  
19 presentation you mentioned that some of the crop yields  
20 had dropped, but I was wondering if there were other --  
21 what you think some of the other reasons are for the  
22 fluctuations year to year.

23 MR. NASTARI: Thank you, Commissioner Scott.

24 Well, the reason is basically because ethanol  
25 trade is still in its infancy. And fluctuations are a

1 reflection of the needs of import in the U.S., and  
2 eventually the availability of product in Brazil and  
3 elsewhere, but mostly the fluctuations in the needs of  
4 imports in the U.S., because the trade in proportion to  
5 total demand is still small.

6 We believe that this tends to increase as the  
7 trade barriers have been lifted. And we should see a  
8 more increased trade in the future.

9 But, essentially, that's what happened.

10 COMMISSIONER SCOTT: Thank you.

11 COMMISSIONER MC ALLISTER: This is Commissioner  
12 Andrew McAllister, I do have a question. But first,  
13 (speaks in Portuguese) --

14 I have a question about the hierarchy, really,  
15 between sugar production and ethanol production. If I'm  
16 an owner of, you know, property with cane on it, what's  
17 my priority? How do I get the most value out of that as  
18 far as, you know, do I extract as much sugar as I  
19 possibly can, and ethanol is what's kind of left over,  
20 or what's my business value proposition for that  
21 property, that crop?

22 MR. NASTARI: Thank you, Commissioner  
23 McAllister. Today approximately 50 percent of the cane  
24 is diverted to ethanol and 50 percent for sugar in  
25 Brazil.



1           And Brazil has created a system whereby  
2   feedstock producers, cane producers participate in the  
3   bonus and onus, the benefit and the -- the good times  
4   and the bad times in the price of end products.

5           Which is a system which provides stability and  
6   it's a system which is not seen very often worldwide.  
7   Very often, governments intervene and establish the  
8   price of feedstock irrespective of the price of end  
9   products.

10           This system that is in place in Brazil is  
11   completely market driven. There is no government  
12   interference. And the value for a cane producer comes  
13   from the price of sugar and ethanol.

14           So, when the prices are good, the prices of cane  
15   are good. When prices are not so good, the prices of  
16   cane are not so good. And that's what brings the  
17   driving force for people to keep constantly looking for  
18   higher productivity rates.

19           And that's what we see as the motivation for the  
20   productivity increases that have happened, you know, in  
21   such an important level in the past few years.

22           COMMISSIONER MC ALLISTER: But you could see the  
23   percentages of sugar versus ethanol out of a given  
24   property change over time depending on marketplaces, I  
25   guess that's what I'm hearing you say.

1 MR. NASTARI: Oh, yes.

2 COMMISSIONER MC ALLISTER: Okay.

3 MR. NASTARI: Yes, there is flexibility in the  
4 proportion which can be diverted to sugar and ethanol.  
5 And this flexibility is at the industry level, not at  
6 the farm, of course.

7 But there is certain flexibility and depending  
8 on relative prices mills can ship more product into one  
9 or other product if prices are more interesting.

10 And that's what I referred in my presentation.  
11 You know, if ethanol received the price referenced to  
12 toluene, not gasoline, certainly we would see a higher  
13 proportion of the exportable surplus going for ethanol  
14 instead of sugar.

15 COMMISSIONER MC ALLISTER: Okay, great, thank  
16 you very much.

17 MR. OLSON: Okay, thank you very much, Plinio,  
18 again for spending the time and participating from  
19 several thousand miles away.

20 MR. NASTARI: Thank you.

21 MR. OLSON: Hopefully, you can stay on the line.  
22 We will have some other public comments at the end of  
23 the morning here, within the next hour. If not, we can  
24 just contact you at a future date.

25 MR. NASTARI: Thank you. I'm available, I'll be

1 glad to respond to any questions. I can stay until 4:00  
2 p.m. Brazil time, which is for another hour. So, I'll  
3 be glad to be listening carefully.

4 MR. OLSON: Thank you very much.

5 We'd like to go to the next speaker, now, and  
6 this will be kind of a tag team match here with Russ  
7 Teall and Joe Gershen who represent the California  
8 Biodiesel Alliance, and get their insights on a lot of  
9 in-state production of projects.

10 MR. TEALL: Thank you, Tim. At least we weren't  
11 called a Mexican tag team. I would have been Nacho  
12 Libre and Joe would have been somebody else, I'm not  
13 sure. And I didn't bring my leather helmet so --

14 Anyway, we're here today to, you know, address a  
15 pretty simple question as Tim said in the middle -- in  
16 the beginning, but it's a pretty complex answer, you  
17 know, to get down to it.

18 We're going to cover, basically, three different  
19 topics in only seven slides, but it's fairly dense. And  
20 so we'll do an overview of it and kind of describe the  
21 methodology we went through.

22 But really to get the full import of it, you  
23 know, will require further drill down and analysis.

24 My name is Russ Teall. I'm the President and  
25 Founder of Biodico Sustainable Bio Refineries. It's a

1 private company. We develop projects in California,  
2 different parts of the U.S., and Australia.

3 I'm also the President this year of the  
4 California Biodiesel Alliance which is a trade  
5 association of California biodiesel producers, and  
6 stakeholders, and out-of-state producers that are  
7 interested in the California market.

8 And Joe Gershen, who's the Vice President of  
9 Marketing for Crimson Renewable Energy, and also the  
10 Vice Chairman of the CBA this year.

11 So, what we're going to cover, basically, is a  
12 census of what's going on with biodiesel in California  
13 right now, a survey that we did that was recently  
14 released, and then talk about the metrics of biodiesel.

15 The map that you see to the right of the screen  
16 was actually put together by the Environmental Defense  
17 Fund. They're doing an independent analysis of  
18 biodiesel infrastructure in the State.

19 This is a draft. It's a work in progress. And  
20 their final brochure, and maps, and graphs and analysis  
21 should be available in the next 30 days or so, and we're  
22 looking forward to that.

23 What I found of particular interest was the  
24 graph in the upper right-hand corner. And you see an  
25 increase in biodiesel production and then a drop into

1 the valley of death, as they say, before recovering.

2 And the analysis on that basically comes from  
3 CEC numbers, from Gary Ell's shop, was that during that  
4 period of time the government incentives, especially on  
5 the Federal level, were on again/off again.

6 You know there was problems with the RINs in  
7 terms of fraud. The subsidies were on again/off again  
8 year by year, frequently in a retroactive manner so that  
9 there was no direct stimulus to production.

10 And it's kind of a illustrative story of what  
11 goes wrong when government fails to send a consistent  
12 signal.

13 Okay, the biodiesel census, basically in 2012  
14 there were eight in-state biodiesel production  
15 facilities, producing about 16 million gallons a year.

16 The capacity was slightly less than 40 million  
17 gallons a year, so there was about a 40 percent  
18 utilization.

19 In 2013 a couple of new facilities came online,  
20 nine to ten is our best estimate, with a production  
21 estimate of about 26 million gallons a year capacity of  
22 slightly less than 60, about a 43 percent utilization.

23 So you see about an 8 percent increase overall  
24 in utilization but, still, a tremendous amount of  
25 underutilization which in part led to our survey to find

1 out why are these plants being underutilized.

2 If you compare this production to the amount of  
3 diesel fuel consumed in California, which right now is  
4 about 3.3 billion gallons a year, the blend percentage  
5 of biodiesel would be .5 to .8 percent, so very, very  
6 small.

7 If you focus on the low carbon fuel standard,  
8 which requires a 10 percent carbon intensity reduction  
9 by obligated parties by 2020, the computed number of  
10 gallons that will be needed to meet the diesel  
11 requirement, and again these are fungible between gas  
12 and diesel, but just focusing on the diesel requirement.

13 If you had a biodiesel or diesel alternative  
14 with a carbon intensity of less than 20, it would  
15 require about 540 million gallons a year of biodiesel.  
16 That would equal about a 12.6 percent blend.

17 And as Allen pointed out, you can use up to a 20  
18 percent blend. And so we're well within what people  
19 call the blend wall.

20 So, B5 would be about 215 million gallons a  
21 year, B20 would be 855.

22 The current U.S. biodiesel production capacity  
23 is over 2 billion gallons a year, some estimates as high  
24 as 2.5 billion gallons a year.

25 The saying in the industry, of course, is that

1 it's a three-legged stool. In order to have a  
2 successful biofuel you need feedstock, production and  
3 sales. And so feedstocks come first, you know, what are  
4 the feedstocks that are available? What's actually  
5 being utilized and what's the potential for feedstock?

6 Right now in-state used cooking oil, which has a  
7 carbon intensity of anywhere from 11.76 to 15.84,  
8 there's 100 to 150 million gallons a year available in-  
9 state, close to a billion gallons a year nationwide.

10 Animal fat is frequently mixed in with used  
11 cooking oil, so it's difficult to, on a statewide basis,  
12 get a separate number for that.

13 Out of state, throughout the U.S., there's about  
14 800 million gallons a year.

15 Corn oil, which has a very, very low carbon  
16 intensity of 4, in-state there's approximately 5 million  
17 gallons a year being used. Out of state the EPA  
18 estimates that there's about 500 million gallons a year  
19 available.

20 As the California Biodiesel Alliance we looked  
21 at this and realized that there's a tremendous potential  
22 in the state to develop feedstocks in California, with  
23 low carbon intensity that benefit the entire value  
24 chain.

25 So, in areas like Central California, Western

1 Fresno County, where there's an unemployment rate of 24  
2 to 40 percent, there's a lot of underutilized land,  
3 principally because of selenium contamination and saline  
4 contamination that can be used for growing feedstocks  
5 without displacing food crops.

6 And so we're showing on the right-hand side  
7 several of the projects that are currently underway. In  
8 the upper right-hand corner is Dr. Steven Kaffka, from  
9 UC Davis. He's the Director of the California Biomass  
10 Collaborative, which looks at feedstocks for both  
11 ethanol, and biodiesel, and renewable diesel.

12 He's there at one of the UC Davis field stations  
13 with one of the euphorbia's. That's the family of  
14 plants that include castor, and dutropha, and things  
15 like that. They have up to a 50 percent oil content.

16 The next picture down was taken about eight  
17 years ago. That's at Red Rock Ranch. And that's  
18 processing a brassica family, which includes canola,  
19 camelina, mustard, which grows on selenium-contaminated  
20 soil and provides bio-remediation. It's about 30 to 35  
21 percent oil content.

22 And the agroeconomic work on that is still  
23 ongoing at UC Davis and Cal State Fresno.

24 The next picture is used cooking oil collection  
25 at UC Santa Barbara, my alma mater. We've been doing



1     that for the last ten years.

2             And finally, the last picture is a picture of  
3     Dr. Steven Mayfield's project down at UC San Diego doing  
4     algae research. And they're closely affiliated with  
5     sapphire oil and other groups.

6             So, we have in California a tremendous academic  
7     and entrepreneurial base for feedstock development. And  
8     we feel that the potential is there, with the right  
9     incentives, to stimulate that in-state production of  
10    feedstocks, which then leads to in-state production of  
11    the biofuels, themselves.

12            Okay, so the next part is the survey. And like  
13    Tim said, it's a very easy question, and it was posed to  
14    us, it's been posed many times. How much biodiesel do  
15    you think can be produced in, and you fill in the blank,  
16    2013, 2015, 2020?

17            And the answer to that, as we thought about it,  
18    really depends on your assumptions as to what the future  
19    is going to look like.

20            So, you know, what are the incentives, what is  
21    the economic condition, what's the price of diesel fuel,  
22    there's any numbers of factors.

23            So, we structured a survey, basically, to ask  
24    our members first of all, looking at a low scenario, a  
25    low projection, a middle projection and a high

1 projection what do you think are the factors that are  
2 going to be most influential for you to make a  
3 projection about where the industry is going to be under  
4 that scenario?

5           And then we took those factors and compiled them  
6 together so that all the members could see everybody  
7 else's ideas, consolidated them because there was a lot  
8 of overlap, to make sure that we didn't damage anybody's  
9 concepts. We got buy-in from what the questions were,  
10 what the factors were and then had people or members  
11 rank each factor within a category.

12           So, in a low scenario there's maybe 20 different  
13 factors. We asked them to rank them from 1 being not  
14 very influential at all, to 10 being very influential  
15 for each category.

16           And then compiled all those numbers together,  
17 did a simple average and came up with a final number,  
18 and then ranked them from high to low.

19           And then divided them into 25 percent cohorts,  
20 basically so you could see the top 25 percent, the next  
21 25 percent and on down.

22           Some of the bars look bigger. Like the first  
23 one in the low scenario looks like, well, there's, you  
24 know, more in that 25 percent, and that's just because  
25 it happened to cluster there. There were a lot of

1 factors that were very similar and similarly ranked.

2 So, when you go across the categories you'll  
3 see, you know, what the different percentages were in  
4 terms of the most influential factors.

5 And I invite you to take your time, it's  
6 excellent night reading if you're having trouble falling  
7 asleep, to actually drill down into here.

8 I will give you a summary, though. We took each  
9 of the themes, so a factor, for instance, like no Low  
10 Carbon Fuel Standard. That would be a low scenario.

11 A medium scenario would be the Low Carbon Fuel  
12 Standard has been modified, or weakened, or is  
13 inconsistent.

14 And then a high scenario would be a strong,  
15 robust, consistent Low Carbon Fuel Standard.

16 Well, that concept cuts across all categories,  
17 low, medium and high. So, when you look at the  
18 categories and rank the scenario averages, this gives  
19 you an idea of what themes our members thought were most  
20 important in terms of stimulating production of  
21 biodiesel in California.

22 And it's difficult to say that there is a number  
23 one or a number two factor because they all cluster  
24 fairly closely together.

25 But you can see that feedstocks, different sorts

1 of government incentives, the RFS, the RINs, the Low  
2 Carbon Fuel Standard, basic economic considerations of  
3 profitability, diesel prices, government market signals,  
4 plant funding for expansion, and growth of new  
5 facilities, de-bottlenecking old facilities, things like  
6 that can help increase the production of biodiesel.

7           So, after we had them rank the factors, we had  
8 them basically say, okay, based on your assumptions  
9 about what the future's going to look like what do you  
10 think the volumes of biodiesel will be in a low, medium  
11 and high scenario.

12           And again we took everybody's estimates, divided  
13 them by the number of responses, and came up with  
14 averages.

15           And you can see where in 2013 the projection for  
16 a low is 18.8, the projection for a high is 34.6.

17           And as you ramp up for the year 2020, if you  
18 have a low scenario, basically with weak and  
19 inconsistent signals, very little support from  
20 government, adverse market conditions, et cetera,  
21 there's still a growth in biodiesel production, but it's  
22 not very robust. It's about 43.1 million gallons is the  
23 projection at this point.

24           With the high -- and again, this is in-state.  
25 This is not the total amount of biodiesel that would be

1 sold in California, this is just in-state production,  
2 it's about 362.5.

3 We foresee that there will be biodiesel imports  
4 into California, just like there's ethanol imports into  
5 California. There will be renewable diesel coming from  
6 Neste and other resources. But just focusing on in-  
7 state production there's an average of about 362.5.

8 Now, again, these are averages, not ceilings.  
9 So, you know, the potential ranked by some biodiesel  
10 producers was much higher, some lower.

11 But the takeaway here, I think, is that the  
12 factors for growth need to be very carefully considered  
13 and should be used to help inform policy.

14 You know, as an industry we're trying to answer  
15 the question of we're from the government, we're here to  
16 help you, and we're trying to tell you this is how you  
17 can help us.

18 These are the conditions on the ground as we see  
19 them as an industry overall, and these are the things  
20 that could be done to help stimulate biodiesel  
21 production in California using California taxpayer  
22 money to help benefit all the citizens of California.

23 The funding is needed for feedstocks and  
24 production facilities.

25 And then, finally, and this is strictly

1 editorial on my part, but in talking to Tim and Jim,  
2 basically how can -- how can CEC funding, the AB 118  
3 funding be used to greatest effect?

4 And there have been some great projects funded,  
5 ours among them, involving research and development, and  
6 plant expansion, et cetera.

7 But, you know, when you're looking at \$100  
8 million a year divided into segments by many, many  
9 interests, it's not enough, you know, for any one of  
10 these interests to really expand. It can make a  
11 difference, but to make a significant difference we  
12 think that the type of funding available can be changed  
13 into different channels where the funding is used more  
14 for leveraging. Basically, being used to stimulate the  
15 use of loans through industrial development bonds,  
16 through the State Treasurer's Office, which are a tax-  
17 free bond, which are very attractive to investors, or  
18 through bonds.

19 But there are a lot of upfront costs that are  
20 involved in that. And so as the CEC creates projects  
21 that go from R&D to actual commercialization through the  
22 pipeline, when it emerges from the pipeline there should  
23 be something there to say, okay, now you're ready.  
24 You've been through this process and now we want you to  
25 prosper and expand. We're not going to give you money,

1 but we're going to help you obtain a loan, we're going  
2 to help you obtain bonding.

3 And the leverage that can be achieved through  
4 that, with no exposure to the CEC, this is not a loan  
5 guarantee, is basically to say here's a million dollars  
6 that's available for all of the bonding expenses, the  
7 IRB expenses that are involved in obtaining \$50 to \$100  
8 million dollars.

9 And so \$20 million that's available can be  
10 leveraged pretty significantly over a period of years to  
11 create the kind of industry that we want in California.

12 COMMISSIONER MC ALLISTER: So, just if you could  
13 submit a description, sort of a schematic of how that  
14 might work? I mean, I think there are various folks who  
15 work with the other agencies and understand the bond  
16 markets, and sort of the financial transactions that  
17 would involve, but I think it would be good to put our  
18 collective heads around to see what a structure might  
19 look like.

20 It sounds like a very operable idea for the  
21 market -- sort of the mid-section of the market  
22 transformation to bring some real capital to it.

23 And then also any suggestions that you might  
24 have on the -- you know, the rounds of RFPs with AB 118  
25 and, you know, I think they've gotten very robust, for

1 the most part, responses, and I think there have been a  
2 nice diversity of projects there.

3 But, you know, obviously, we're always open to  
4 hearing sort of how things could be targeted or tweaked,  
5 or how things need to evolve with the times and that  
6 sort of thing.

7 So, you know, given your understanding of kind  
8 of this diverse marketplace out there, you know, where  
9 sort of the various eggs go into which baskets would be  
10 helpful.

11 MR. TEALL: Staff has been very receptive.  
12 We've had a whole series of meetings over the past year.  
13 And the latest RFPs are reflecting some of our  
14 recommendations in terms of moving more from research  
15 and development to actual commercialization. You know,  
16 how many volumes of -- you know, how much volume can we  
17 increase it?

18 The next step would be to move to a different  
19 type of financing mechanism, and I'll put that together.  
20 But that's more than just for biodiesel, that's  
21 something that could apply to all the baskets and make a  
22 \$100 million-a-year investment, you know, factored by 50  
23 or 100 times which would be, you know, very significant.

24 COMMISSIONER MC ALLISTER: Great, thank you.

25 MR. TEALL: Okay, I will take off my leather



1 Mexican wrestling hat and hand it over to Joe Gershen.

2 MR. GERSHEN: Okay, I wanted to also point out  
3 in what Russ had said about imports versus in-state  
4 production, I think the Bioenergy Action Plan also calls  
5 for 40 percent in-state production, if possible, of  
6 what's consumed in the state.

7 So, I just wanted to kind of point out the ARFVT  
8 Program requirement that the Commission use metrics to  
9 determine funding criteria, it's not just a good idea.  
10 We actually wanted to point out that it's the law, as  
11 well.

12 In Health and Safety Code 44272, and I'm going  
13 to read a few things here, 44272(c) is states that "The  
14 Commission shall provide preferences to those project  
15 that maximize the goal of the ARFVT Program based on the  
16 following criteria" --

17 And then it goes on to list 11 specific criteria  
18 including petroleum reduction and measurable transition  
19 of alternative fuels, climate change policy, and low  
20 carbon fuel standard, at least 10 percent lifecycle  
21 greenhouse gas reduction, air and water pollutants  
22 reduction, sustainability of state natural resources,  
23 promotion of California business in the jobs we're  
24 creating right now, as well as the use of existing or  
25 proposed fueling infrastructure.

1           It turns out biodiesel meets and exceeds all of  
2 those criteria and it really exceeds it quite  
3 spectacularly.

4           And then Health and Safety Code 44272.7(d), it  
5 states that "It is the intent of the legislature that  
6 the investment plan will provide an analytical rationale  
7 for all proposed expenditures that aligns with the  
8 broader strategic goals for the program and will update,  
9 highlight and explain the rationale for any year-over-  
10 year changes to the program strategy and priorities, and  
11 provide the legislature with all of the necessary  
12 information to fully understand how and why funds are to  
13 be allocated and prioritized within the program."

14           So, we'd like to know where are the metrics  
15 which would provide the analytical rationale?

16           Those of you who know me, know that I've been  
17 sort of beating that drum for a while now, but it's  
18 something that sort of continues to come up.

19           And then, also, if there will be no metrics in  
20 the 2013 IEPR, which I think there were supposed to be,  
21 but I'm hearing rumor that there may not be, I think we  
22 as an industry, we think we must at least use or  
23 continue to try to use the 2011 IEPR Benefits Report,  
24 which includes some metrics there.

25           In that report it states that biodiesel provides

1 34.7 percent of these benefits. And we actually think  
2 when these metrics are done it will show something much  
3 to the north of that.

4 And we think it should receive funding  
5 commensurate with this contribution rather than the 4.8  
6 percent that we currently are receiving.

7 You know, if you look at those metrics,  
8 biodiesel is 9 to 20 times more cost effective than the  
9 other solutions.

10 So, kind of a simple investor question; where  
11 would you want to put your own money from an investment  
12 and a return on the --

13 COMMISSIONER MC ALLISTER: I'll push back on you  
14 a little bit here because I mean I totally see your  
15 point.

16 But, you know, you do have a lot -- if you think  
17 of it in sort of market transformation terms, not every  
18 technology or group of technologies is the same point  
19 along its particular market transformation curve. So,  
20 it does make sense that you'd have a diversity of sort  
21 of current cost effectiveness across those technologies,  
22 and that's not necessarily a bad thing.

23 But certainly, you know, to the extent that one  
24 or the other has limitations, and market barriers, and  
25 sort of opportunities and, you know, you've got to do an

1 independent assessment, so I'm not entirely disagreeing  
2 with you. But I just think we need to keep the bigger  
3 picture in mind because --

4 MR. GERSHEN: We understand the concept of the  
5 transformative goals, although I think there should be  
6 some metrics applied to what those are going to be and  
7 how they're going to work.

8 But also, the disparity between 34.7 percent and  
9 4.8 percent, we'd like to get a little closer to maybe  
10 the other side of that scale, that's all.

11 So, CBA has submitted an updated white paper, I  
12 think most of you know about this, to the docket for  
13 this workshop that goes into even more detail about this  
14 issue.

15 Last year Commissioner Carla Peterman asked  
16 staff to make this matter an urgent priority, but we've  
17 still not really seen any urgency, so we question that.

18 Metrics, and just sort of as a wrap-up statement  
19 here for my portion of this, metrics on the efficacy of  
20 past projects are supposed to be gathered to inform and  
21 guide future investments. Without them, the ARFVT  
22 Program is like a ship without a rudder.

23 Not to belabor this metaphor, but to not use  
24 what metrics we already have is like abandoning our  
25 wheelhouse altogether. That's sort of what we think is

1 a good picture of it. Thanks.

2 MR. OLSON: Russ, did you have anything more  
3 or -- thanks very much.

4 COMMISSIONER MC ALLISTER: Thanks very much,  
5 that was interesting.

6 COMMISSIONER SCOTT: Let me just say that  
7 Commissioner McAllister beat me to both of the points  
8 that I also wanted to make. Which is in terms of the  
9 funding and the financing piece that you mentioned, it  
10 would be terrific to see more detail and information on  
11 that.

12 And, also, I'd just highlight the market  
13 transformation piece that we're also looking at in terms  
14 of what gets funded within the program. So, just wanted  
15 to highlight what you said.

16 COMMISSIONER MC ALLISTER: Sorry.

17 COMMISSIONER SCOTT: No worries.

18 MR. OLSON: Okay, to keep on schedule we're  
19 going to go to our next speaker, Tom Koehler of Pacific  
20 Ethanol.

21 I asked him if he could represent the three  
22 existing companies that have large corn ethanol plants  
23 and talk about -- and he's agreed to do that, the other  
24 companies have agreed to that.

25 And he's going to talk about the nature of how

1 they are shifting to advanced biofuels. Tom Koehler.

2 MR. KOEHLER: Thank you. I appreciate the  
3 opportunity to speak today. My name's Tom Koehler and  
4 I'm representing the California Advanced Energy  
5 Coalition.

6 We're a coalition of a lot of groups. Today I'm  
7 going to focus on the four ethanol plants that are  
8 actually in California today.

9 So, starting from the south there's Calgren  
10 Renewables, which is a 60 million gallon plant operating  
11 today in Pixley.

12 There is the Madera -- the Pacific Ethanol  
13 Madera Facility, which is 40 million, which is not  
14 operating today.

15 There is Amadeus in Keyes, California, which is  
16 a 60 million gallon, which is operating today.

17 And there is a Pacific Ethanol plant in  
18 Stockton, which is also operating today.

19 So, combined capacity of operation today of 180  
20 million gallons.

21 These plants are low carbon producers. They're  
22 all located in areas where unemployment is high.  
23 Roughly, each plant generates around 700 jobs per  
24 facility, economy-wide.

25 All the plants today have been using corn. And

1 as we project out into the future, we'll continue to use  
2 some amount of corn because it just absolutely -- it  
3 makes sense. It integrates into the livestock economy  
4 of the area.

5           So, there is a -- and I'll pause there just to  
6 talk about when we're talking about biofuels, there is  
7 an Orwellian slogan called "food versus fuel" and it's  
8 Orwellian because it -- we need to do both and whether  
9 you're talking about biodiesel or ethanol, both those  
10 processes actually do both.

11           The facilities in California are the largest  
12 feed providers, the largest feed producer in the State  
13 of California are these facilities, to the livestock.

14           And in addition, if you look at the -- when,  
15 let's just say, 2005, when the ethanol national market  
16 took off and the amount of corn that was available for  
17 export and to the animals, and to other sources, other  
18 than ethanol, and you look at today when ethanol's gone  
19 this high and is using a significantly more portion of  
20 the corn, there's more corn today total, on the world  
21 market, for those other uses, other than ethanol than  
22 there was in 2005.

23           So, what has happened is that the increases in  
24 productivity, increases in demand have increased the  
25 supply. So, the world today is producing more fuel and

1 more feed from the land base, and that's a good thing.

2 So, the food versus fuel, it's just a false  
3 argument, it's very Orwellian and I would like to raise  
4 that for the record.

5 We are -- oh, one other aspect of that, which I  
6 also want to put in the docket, which I'll provide a  
7 copy of, is the World Bank most recently released a  
8 report and talked about the impacts on food.

9 And the number one driver for the impacts of  
10 increased food prices is the price of oil.

11 So, any alternative that we use to displace oil  
12 is having a positive impact on the prices of food.

13 We are -- all the companies that I just listed  
14 are currently in the process of commercializing a  
15 variety of technologies.

16 The driver has been the LCFS, so making sure  
17 that that policy maintains a robust, consistent policy  
18 is a large driver for our investment decisions.

19 We are, as one of the ICF put up the slide,  
20 basically in California we're low carbon producers.  
21 We're about 80 CI. We have all submitted pathways to  
22 CARB, some in a variety of pathways between 60 and 77.

23 And we're doing that by projecting the use of  
24 sorghum, so switching from corn, and combining that with  
25 efficiencies in the plant, as well as the use of biogas.



1           So, we see in 2020, you know, with continued  
2   LCFS, with continued support from the Commission we'll  
3   have proposals to you in helping us commercialize this  
4   process of a significant amount of sorghum being used in  
5   2020.

6           The other issue that I want to talk about, and  
7   this is very much in your wheelhouse, but it's also in  
8   CARB's, but it's in your wheelhouse to care about and  
9   advocate for, and it has to do with market barriers.

10          And, Commissioner, you talked about the capital  
11   market, you know, that the government's not going to  
12   provide the capital, and that's true to a large extent.  
13   But one role of government is to make sure that all  
14   barriers are removed and to have full access to the  
15   market, both from a consumer -- essentially have the  
16   consumers have full access to the market.

17          And right now we don't have that. Consumers  
18   don't have access to the market in terms of ethanol.  
19   I'm referring to the blend levels which are effectively  
20   capped at 10 percent.

21          Last year the EPA approved E15 for all cars from  
22   2001 on, and forward. So that's a large chunk of the  
23   market.

24          And what really needs to happen in the most  
25   expeditious fashion to continue to send the right

1 signals for investment is for the predictive model to be  
2 updated to where any levels up to E15, but it could be  
3 E11, or it could be E12, or it could be E13, depending  
4 on what the market dictates and depending upon what the  
5 consumer wants.

6 But today, and for the last three or four years,  
7 ethanol's been somewhere between 50 cents and a dollar  
8 cheaper than gasoline.

9 Well, the consumer needs to have access to that  
10 and it's a very simple process to make that happen.  
11 It's a bit time consuming so we ought to get started on  
12 it.

13 And I would put that as from an infrastructure  
14 stand point at a high priority item for the CEC.

15 So, those are my points and I'm happy to answer  
16 any questions.

17 COMMISSIONER MC ALLISTER: Thanks very much.

18 MR. KOEHLER: Okay, thank you.

19 COMMISSIONER MC ALLISTER: Let's keep it rolling  
20 along. We appreciate your being here, thanks.

21 MR. OLSON: Thank you, Tom.

22 And our last speaker this morning is Adam  
23 Walter, representing Propel Fuels. And by the way, we  
24 do have another speaker on biofuels right after  
25 lunchtime. And it's also some additional information on

1 Brazilian Sugarcane.

2 But at this point I'd like to introduce Adam to  
3 talk about some of the infrastructure topics related to  
4 biofuels.

5 MR. WALTER: Thank you, Tim, Commissioners,  
6 participants. Thank you to everyone for having us  
7 today. It's my pleasure to be here talking about these  
8 important issues for our State.

9 So, from Propel Fuels, for those of you who  
10 don't know I'll talk a little bit about who we are, what  
11 our mission is. I'll talk a little bit about the  
12 alternative fuel infrastructure that is installed to  
13 date, where we're going, and some of the challenges and  
14 opportunities that we face.

15 Propel Fuels is the leading renewable fuel  
16 retailer on the West Coast. So, we sell E85 and  
17 biodiesel, usually in a B20 blend, and we have stations  
18 in California and Washington.

19 Our mission is engage consumers in the  
20 transition to alternative fuels, create a leading  
21 network of alternative fuel filling stations, and build  
22 a leading clean fuel brand.

23 So, I thought I'd just share some pictures with  
24 you all of some of the recent construction that we've  
25 done in the State. This is a station we constructed in

1 March, in La Mirada, which is in the greater L.A. area.

2           You can see the tank hole here, the underground  
3 source tank being installed with a crane. That's a  
4 14,000 gallon, three-compartment tank. I mean this is a  
5 pretty big construction project for a gas station here.

6           So, more pictures of this install. This is the  
7 tank in the ground and a very happy owner and operator  
8 when it's all said and done.

9           This is another station that we just recently  
10 opened, the first one in the Central Valley, in Fresno.  
11 And this is a full station. So, usually, you know,  
12 Propel's traditional model was we would partner with an  
13 existing gasoline station operator and install just one  
14 pump and a tank on their site.

15           What we've done recently is we're starting to  
16 acquire full stations, ourselves, and install  
17 underground storage tanks and operate the petroleum  
18 fuel, as well.

19           So, Fresno, this is what we call a Clean  
20 Mobility Center. And it really turned out well. I've  
21 got some more pictures of that later on.

22           This is an example of another clean fuel point.  
23 As I said, the more traditional model where we have a  
24 large canopy, which we're trying not to do as many of  
25 these anymore because they're very expensive.

1           And as you can see, this is sort of an example  
2 of some of the general conditions that a city will  
3 require you to do when they install something in their  
4 jurisdiction.

5           Locals refer to this one as the Taj Mahal, and  
6 another happy operator there and the happy customers.

7           So, we've got -- this is a recent station  
8 opening in Sylmar on the left, and the bottom right,  
9 with you can see some of the happy Hummer drivers  
10 filling up with flex fuel. And the Clean Cities  
11 Coalition logo on all of our pumps, as well as some of  
12 what we call tuners down on the bottom right.

13           With the Subaru's, a lot of these high  
14 performance engines guys like to tweak the computer  
15 chips in there to allow for the higher octane fuel,  
16 which is cheaper than race fuel.

17           And then the top right is our first customer at  
18 Fresno hugging the EVR Phase 2 nozzle that we have  
19 there.

20           So, where are we at currently? E85prices.com,  
21 78 E85 stations in California; I don't believe all of  
22 those are public. I think the public number is closer  
23 to about 65 today.

24           And if you take the high side of what we do  
25 monthly, gallons throughput on some of our stations,

1 that's approximately 30 million gallons per year of  
2 annual throughout capacity installed in the State today.

3 Currently, just taking E85, that's about .1  
4 percent of the total ethanol demand in the State.

5 Again, we have about a 1.5 billion gallon per year  
6 gasoline market.

7 E10 is, you know, ten percent of that, obviously  
8 Ethanol, E85, high level blends are only .1 percent at  
9 this time.

10 But we have over one million flex fuel vehicles  
11 in the State and we believe that that number is  
12 continuing to grow as there are many, many more flex  
13 fuel vehicles being sold in California and in the U.S.  
14 every year.

15 So, just a snapshot of some the locations in  
16 Southern California and Northern California, you can see  
17 they're mostly clustered in the higher population areas.

18 We always target our stations to be installed in  
19 zip codes with the highest flex fuel vehicle counts. So  
20 that's one of the traps that we run before we do any  
21 builds on any stations, we look for that criteria.

22 Propel just opened our 34th alternative fuel  
23 filling station in the State yesterday, actually at  
24 Wildomar. So, that's an E85 only station and we're  
25 partnered with the dealer there. We're doing a number

1 of installations with them.

2 They operate a Chevron, currently, at a great  
3 location right off the freeway.

4 So, we have constructed about 12 stations in the  
5 last eight months. We also sell B20 at most of our  
6 stations.

7 And Propel has about three grants that we've --  
8 well, yes, not about, we have three grants that we've  
9 been awarded in the last couple of years; the LCFI-3  
10 grant, the Low Carbon Fuel Infrastructure Investment  
11 Initiative, which we're currently about 40 percent  
12 through with the Department of General Services, the  
13 Department of Energy and the California Energy  
14 Commission.

15 There is an LCFI-3-2 grant, which is for 10  
16 stations that we will begin executing on sometime in  
17 2014.

18 And then also the Clean Grant which is for  
19 another 100 stations, \$10 million from the CEC, which we  
20 will start on after that.

21 So, what is the potential? You know, the CEC  
22 and DOE grants, as I said, have provided incentives for  
23 the first LCFI-3 grant, the 75 LCFI-3-2 is another 10, a  
24 hundred for clean, which takes it to 185 total for  
25 Propel. Plus, Pearson, I believe, has just received

1 another award for about 15 stations.

2 So, to date we've received grants for 200  
3 stations.

4 By the CEC's own modeling and analysis the  
5 market in California could handle up to 1,000 stations.

6 So, we would project that we would be able to  
7 finish with the 200 stations that we're currently  
8 operating on the agreement for by 2015. That's not just  
9 Propel, but Pearson as well.

10 And that would provide about 75 percent  
11 coverage. In terms of drive time, we talk a 12-minute  
12 drive time. It's good, you know, 75 percent coverage.

13 But by comparison, a typical gasoline driver can  
14 find a station in about a two-minute drive time. So, by  
15 no means should we rest on our laurels here and take  
16 this as a signal to not continue to fund these projects.

17 So, what are some of the challenges that we  
18 face? Permitting is, by and large, I think the largest  
19 challenge that we face.

20 Myself, I'm the Program Manager, I'm managing  
21 the architects and contractors throughout the permitting  
22 process, design build, engineering, and we face  
23 challenges at the State and the local level.

24 The State CUPAs, which is the Certified Unified  
25 Program Agency, part of the State Water Board, they



1 operate at the local level and are basically, completely  
2 independent of the State. So, the State may try to  
3 influence them, but at the end of the day you're dealing  
4 with the local municipalities and whatever challenges  
5 they may have.

6 So, L.A. Department of Public Works, for  
7 example, is backed up four to six months in processing  
8 permit applications right now, which is just a killer  
9 for any projects that we're trying to move quickly.

10 The Air Quality Management District, as I  
11 mentioned in Fresno, we have an AVR Phase 2 nozzle  
12 there.

13 For some reason the San Joaquin Air Quality  
14 Control District has not adopted the executive order  
15 from, I believe it was 2009, exempting E85 from EVR  
16 Phase 2.

17 So, all of our other stations in the entire  
18 State have EVR Phase 1. And we, at this point, are not  
19 going to develop anymore in the Central Valley until  
20 they adopt that executive order, which they say they're  
21 going to do in December.

22 So, local, obviously we face challenges at the  
23 local level, as I mentioned, with the Taj Mahal and  
24 Claremont general conditions. When you go in and you  
25 apply for a new permit application they use that as an

1 opportunity bring the rest of the site in compliance  
2 with whatever little things may be hanging out. So, we  
3 often have to come out of pocket for those expenses on  
4 behalf of the station, even though they're not related  
5 to the project.

6 And then conditional use permits, right, every  
7 gasoline station in the State of California operates  
8 under a conditional use permit. If you have to modify  
9 that conditional use permit, as we're having to do in  
10 Oceanside right now because we're changing the motor  
11 vehicle fuel that we're selling, that can be a very,  
12 very timely process. We're talking three to four  
13 months, if not longer, and very expensive as well.

14 Grant administration, you know, this can be a  
15 challenge just in the mechanics of payment. You know,  
16 for instance we have not received a payment from the DOE  
17 in, you know, quite some time on this program even  
18 though we've built a number of stations over the last  
19 nine months. And that's causing some consternation for  
20 ourselves internally, as well as our investors.

21 You know, the guys from CBA did a great job  
22 talking about how, you know, the markets really need  
23 consistent support in terms of capital availability and  
24 commitment over the long haul.

25 And I would like to say that the CEC has been a

1 great partner and thank you all for doing all that you  
2 can to help move the process forward, and process  
3 payments quickly, so thanks for that.

4 And then equipment standards, you know, when  
5 you're bringing new fuels to market oftentimes  
6 regulations have not caught up with the development of  
7 these future fuels.

8 So, as we've seen with the water board,  
9 recently, and renewable diesel, well, at some racks in  
10 Fresno they're selling renewable diesel today. We don't  
11 believe that the regulations are clear enough today for  
12 Propel to take the risk to begin selling renewable  
13 diesel in our tanks until Underwriters Laboratories  
14 comes out with a judgment. Hopefully in the next few  
15 months, but there's really no time frame on that.

16 Otherwise, we're stuck lobbying our own  
17 manufacturers of components for signing a statement of  
18 affirmative compatibility with the water board and  
19 taking on that liability themselves which -- and often,  
20 in most cases they're not willing to do just because  
21 they don't understand the fuels, yet. So, some  
22 challenges we're facing there.

23 But also there's some opportunities, right. So,  
24 blend levels, as Tom mentioned, from Pacific Ethanol,  
25 you know, one of the biggest opportunities that we have

1 right now is to be able to increase the blend level in  
2 the State of California from E10 to E15.

3 The blend wall is here today and it is a real  
4 thing for the ethanol industry, for the alternative fuel  
5 retailers.

6 Propel is installing the infrastructure today to  
7 be able to sell higher blends of renewable fuels, and  
8 today it's either E10 or it's E85, but there's nothing  
9 in between.

10 So, you know, if we were able to open the way to  
11 E20, or E30, or E50 the properties of that blend is  
12 actually better than any combination of just E10 or E85.

13 And like I said, the infrastructure is going in  
14 today so a change in policy would be the quickest and  
15 easiest way to increase ethanol blends in the State.

16 Renewable identification numbers, which are part  
17 of the Federal RFS, we've seen values rise to over a  
18 dollar per gallon in the last couple of months. This is  
19 an historic rise in the price and it's provided some  
20 much needed support to the bottom line for us retailers  
21 and blenders of the fuel.

22 The same with the LCFS, we've seen LCFS credits  
23 rise now to \$60 a metric ton, which translates into real  
24 pennies per gallon. You know, I'm talking two or three  
25 depending on the blend of biodiesel that you're using.

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1 But again, it's some much needed support for the  
2 industry at this time.

3 Carbon reductions, you know, to date Propel has  
4 collectively saved 77 million pounds of carbon dioxide  
5 from the atmosphere through -- this is directly from the  
6 consumers purchasing the fuels at our stations.

7 And we're also offering carbon offsets at our  
8 petroleum stations now, so for a dollar you can offset  
9 all the carbon directions of your -- or excuse me,  
10 carbon emissions of your purchase there. So, something  
11 cool and exciting we're doing there.

12 And then future fuels, which I'll talk about a  
13 little bit more in a second. You know, there's two  
14 platforms for advanced biofuels that we can leverage  
15 today, and both of which Propel isn't selling.

16 The flex fuel ethanol, as was mentioned a lot of  
17 the ethanol producers in the State are going to sorghum.  
18 We've seen the guys in the Central Valley doing sugar  
19 beets. Cellulosic ethanol is coming, and municipal  
20 solid waste. All of that can be leveraged with the  
21 existing infrastructure that we are installing  
22 currently.

23 And diesel, renewable diesel, as I mentioned  
24 it's being retailed today. There's more we can do to  
25 incentivize these fuels and the infrastructure to be

1 installed to take advantage of those.

2 One of the examples that we did recently, in  
3 November of 2012, just last year, we did an event at our  
4 Redwood City station, on Whipple, with Solazyme, which  
5 is one of the leaders in the industry, and sold algae-  
6 based biodiesel to the public for the first time ever.

7 So, it was front page news on the *San Francisco*  
8 *Chronicle*, a lot of press coverage. We really had  
9 solid, you know, response from consumers, 35 percent  
10 volume increase throughout the Bay Area stations that  
11 were taking place with this pilot.

12 Ninety-two percent of participants noted that  
13 they would be more likely to purchase algae-derived  
14 fuels in the future. Seventy percent indicated they  
15 would purchase more fuel if it was derived from algae,  
16 and 40 percent said they would pay a premium.

17 So, I think a really great event and really  
18 happy with that pilot.

19 We're looking to do some more demonstrations to  
20 bring cellulosic ethanol directly to the public in the  
21 future, as well, as that becomes available.

22 So, closing thoughts, you know, we've seen  
23 really strong consumer demand volumes remain high,  
24 really higher than we've ever seen. The Fresno station  
25 is knocking the skin off the ball and if we could get

1 through that DVR Phase 2 issue we would put another pump  
2 on that station because volume is just so strong.

3 So consumers, and I can't tell you enough, love  
4 the fuel, they love the stations. Everywhere we go they  
5 say build one here, build one here. You know, social  
6 media's presence is great. So, I can't say enough about  
7 our wonderful customer base and how excited they are  
8 about the fuels.

9 But, you know, despite the challenges, as I  
10 mentioned the industry is making solid progress. And as  
11 I've said, there's still some work to do and the Energy  
12 Commission's and other State agencies' continued support  
13 is very much needed and welcome.

14 So thank you for having me today and I'm happy  
15 to entertain any questions.

16 COMMISSIONER MC ALLISTER: Thanks very much. I  
17 really enjoyed by ribbon cutting at one of your stations  
18 down in the southlands, and definitely felt the love  
19 from the public who stopped by, and definitely the  
20 excitement around the station, itself. So, I think it  
21 was Fullerton, I believe, yeah.

22 But, yeah, thanks for all -- I mean, really, the  
23 hard work on the ground. I mean, you know, the barriers  
24 up and down the chain, you know, certainly we can help  
25 with some of those. But a lot of it is local and the

1    permitting, as you referred to. I mean and that's not  
2    just in this sphere, but it's across the board in any  
3    sort of infrastructure you want to build.

4                So, definitely can appreciate all of those  
5    challenges and it takes a good, dedicated business  
6    that's got a value proposition and a business model that  
7    they think is really going to work to motivate the kind  
8    of creativity to get that stuff done.

9                So, you know, I'm feeling the challenges and  
10   really appreciate your work, so thanks for being here.

11               MR. WALTER: My pleasure.

12               COMMISSIONER MC ALLISTER: So, I believe we have  
13   some public comment now; is that right? Let's move on  
14   to public comment. We're just a few minutes behind here  
15   so --

16               MR. OLSON: Yeah, if you want to go to public  
17   comment, I know there's a couple -- Robert Bienenfeld,  
18   from Honda, has some comments.

19               If we don't have blue cards, but if you are  
20   interested, just raise your hand or come up to the dais  
21   up here, the lectern, yeah.

22               MR. BIENENFELD: Good morning Commissioner Scott  
23   and Commissioner McAllister.

24               I'm Robert Bienenfeld from American Honda Motor  
25   Company. I'm the Assistant Vice President of



1 Environment and Energy Strategy.

2 I appreciate the change to speak a little bit  
3 out of order. I think you're going to cover fuel cell  
4 vehicles this afternoon, but I have a schedule conflict.

5 Honda has a portfolio, what we call a portfolio  
6 approach to addressing the long-term goals of society,  
7 which has to do with reducing petroleum consumption and  
8 reducing the carbon emissions from our vehicles, as well  
9 as air quality, addressing air quality concerns.

10 So towards that end we have a very clean fleet,  
11 along with advanced technology vehicles, such as CNG,  
12 hybrid, plug-in hybrid, battery electric and fuel cell  
13 electric vehicle technology. And we've had many of  
14 those vehicles on the road for years.

15 California's goals are challenging. I think  
16 there's no question that it is enormously difficult to  
17 make this transition to any fuel other than the liquid  
18 fuels that the -- that society's been accustomed to.

19 And the success of that transition is not at all  
20 clear.

21 So, we're very enthusiastic about the future of  
22 fuel cell electric vehicles. They're one of the few  
23 near zero emission or zero emission vehicles that have  
24 the chance to fully replace an ICE due to their  
25 features, the kind of applications they can operate in

1 are broad. And they have the similar attributes of  
2 conventional vehicles, they can refuel in five minutes  
3 and have a range of 300 miles.

4           Honda's had the FCX Clarity on the road in  
5 California since 2008. We had a prototype version  
6 before that, beginning in 2002. And we've been getting  
7 really good information from the market on real-world  
8 performance, not just of our vehicles, but of consumer  
9 habits, of the requirements for infrastructure, where  
10 the infrastructure needs to be.

11           And we've had a very good relationship with the  
12 Energy Commission. We've been able to feed back that  
13 valuable information into the kinds of PONS that you've  
14 offered in order to get the infrastructure out.

15           As we look towards the future, Honda has  
16 announced plans to bring a next generation fuel cell  
17 vehicle to market in calendar year 2015. And that will  
18 be of significantly larger scale than the FCX Clarity.  
19 And it is obviously contingent upon the availability of  
20 infrastructure.

21           We're very pleased with the efforts that have  
22 been made, especially of late, with respect to  
23 infrastructure in California.

24           We have been supportive, both directly and  
25 through our trade associations, of the funding which is

1 currently being proposed in AB 8 and SB 11 to fund up to  
2 100 stations.

3 We think that the roadmap that has been  
4 published by the California Fuel Cell Partnership is --  
5 reflects all the input of the major OEMs that are coming  
6 to market with fuel cell vehicles. It's comprehensive,  
7 it's very thoughtful.

8 And in our analysis, we have determined that the  
9 68 stations really does represent the emerging market.

10 So, if you look at where those stations are  
11 relative to hybrid owners, or battery electric vehicle  
12 owners, those stations are in the right markets, where  
13 the psychographic and demographic attitudes of people  
14 are consistent with an approach to be open to these  
15 advanced new technologies.

16 And then towards the long term, Honda recently  
17 announced a partnership with General Motors to  
18 collaborate on a 2020 fuel cell power plant and hydrogen  
19 storage, a common set of drawings that could be used for  
20 both companies. In this way we hope to drive down the  
21 cost and really accelerate commercialization.

22 We'd like to thank the CEC for their continued  
23 support and investment in hydrogen infrastructure and  
24 I'm happy to answer any questions for you.

25 COMMISSIONER MC ALLISTER: Well, thanks for

1 being here. I got to drive one the other day when we  
2 had some out front, so thanks for that. And, you know,  
3 I think rather than -- it's interesting to just keep in  
4 touch with how you see the marketplace going and sort of  
5 where things seem to be evolving.

6 I mean, obviously, it's a very attractive  
7 technology for the reasons you mentioned. Again, you  
8 know, it's the challenge of sort of helping -- you know,  
9 having the right policies to get the marketplace going  
10 and, you know, industry's obviously got the most central  
11 role in making that -- sort of getting the product to  
12 the level where it can really go massive and exist, you  
13 know, on its own merits.

14 You know, but we're all kind of aiming in the  
15 same direction, so I really appreciate you being here  
16 and hearing your comments.

17 MR. BIENENFELD: Okay, thank you.

18 MR. MUI: Good morning -- oh, I should probably  
19 say good afternoon, Commissioners. Thank you for the  
20 opportunity to give some public testimony today.

21 I'm Simon Mui with the Natural Resources Defense  
22 Council.

23 Thank you, everyone, actually for bringing  
24 together really a diverse group of stakeholders on  
25 today's agenda. I agree that this could take literally

1 three days to go through a lot of these really  
2 information-rich presentations.

3           You know, I'll keep my comments limited to the  
4 biofuels discussion. You know, NRDC very much sees a  
5 lot of these different fuels, not just hydrogen,  
6 electricity and advanced biofuels playing a key role  
7 here.

8           We don't see the ability to meet our longer term  
9 GHG reduction goals really without a direct liquid fuel  
10 replacement.

11           And that's why we've focused so much time and  
12 effort in terms of things like the Low Carbon Fuel  
13 Standard, but also AB 32 and the State's plan, together  
14 with AB 118.

15           One of the areas that I just want to encourage  
16 that I heard a little bit about was around this question  
17 about feedstocks, and taking -- having CEC take a look  
18 at the feedstock equation.

19           Because, essentially, a lot of the energy  
20 sources for biofuels will be determined in part by the  
21 availability and supply of low carbon feedstocks.

22           And in our past work we've spent a lot of time  
23 looking at certification programs, like the Roundtable  
24 and Sustainable Biomaterials, to help provide both  
25 assurances, as well as encouragement for certain types

1 of feedstocks that are identified as sustainable.

2 And, you know, I see Mike Wall here from ARB,  
3 they also have a Sustainability Working Group looking at  
4 the Low Carbon Fuel Standard, looking at ways to  
5 incentivize those types of feedstocks.

6 And I think one of the areas that CEC could have  
7 also a bigger role in is helping provide sort of either  
8 incentives or a forum to have those specific types of  
9 feedstocks encouraged and certified, so that there are  
10 assurances going forward that we are developing the best  
11 sorts of biofuels, the lowest carbon. But also ones  
12 that can help reduce things like fertilizer use, water  
13 usage, all the practices that are consistent with a  
14 longer term goal of replacing a large pool of liquid  
15 fuels.

16 And I just want to close off by just commenting  
17 on a little bit around metrics, because that seemed to  
18 come up quite a bit during today's discussion.

19 But really, you know, metrics around AB 118, but  
20 also around looking, as you go forward, around the  
21 transportation forecast.

22 You know, I think the metrics in the reports  
23 right now primarily focus around, you know, here are the  
24 volume penetrations and costs. But I'd encourage  
25 looking at, also, because part of the goals around the

1 Energy Commission are about diversifying the energy  
2 sources, looking at metrics around, you know, the value  
3 of diversification, you know, expanding the energy  
4 supplies in California, as well as the GHG emission  
5 reductions from the different types of scenarios, as  
6 well as the individual fuels would be a good way to look  
7 at it.

8           And one area that is particularly valuable is to  
9 have a better understanding of the benefits in terms of  
10 energy security, but also in terms of the reduced --  
11 having a greater amount of fuel suppliers in the  
12 marketplace in California, and what impacts those have  
13 in terms of prices, in terms of costs, that  
14 diversification particularly given California's large  
15 fuel consumption would be a helpful area for the IEPR to  
16 go forward looking at.

17           And I will just close off that, you know, I  
18 think going forward everyone seemed to be supporting  
19 CEC's efforts around AB 118 and it's more a question  
20 about dividing up the pie.

21           But I would also looking forward, you know,  
22 three, four, five years out, even a decade out, I think  
23 to the extent we can have this meshing of conversations  
24 and metrics around AB 118 investments, as well as the  
25 GHG investment plan being developed by the sister

1 agency, ARB, I think will go a long way to making sure  
2 the pie is -- the slices are not just divided up right,  
3 but also large enough.

4 And I think that's one of the challenges CEC has  
5 had in terms of the AB 118 process is that all of these  
6 technologies are in different stages, there's near term  
7 and longer term sort of considerations.

8 And to the extent we can look at a variety of  
9 metrics, I think that is a helpful way, but not to  
10 forget that there's also other pots going forward that  
11 it would be great to have coordination between CEC, and  
12 ARB, and other pools going forward.

13 So thank you.

14 COMMISSIONER MC ALLISTER: Thanks very much for  
15 your comments, totally agree.

16 And I mean I think that to the extent that this  
17 conversation is broader than just the agencies, you  
18 know, the bigger ecosystem includes NRDC and others I  
19 think is really helpful to frame the discussions for all  
20 of us, you know, in terms of sort of what's at stake and  
21 what's needed.

22 And then, also, just keeping us all focused on  
23 the right things in the conversation.

24 So, if the need is to grow that pie, you know,  
25 it's got to be well-justified and it's got to be, you



1 know, enough of the stakeholders on board to make that  
2 happen, you know, to reach our -- what are essentially  
3 common policy goals.

4 So, a lot of it is information and working  
5 together to kind of have the conversations steer in a  
6 productive direction. And, I mean that obviously rests  
7 with the agencies, finally, but it is a broader  
8 conversation than just that, so really appreciate your  
9 contribution to that.

10 MR. OLSON: Okay, any other questions in the  
11 room here?

12 I don't think we have any questions online or on  
13 the phone.

14 COMMISSIONER MC ALLISTER: Okay, so --

15 MR. OLSON: So, Commissioners, your preference  
16 for --

17 COMMISSIONER MC ALLISTER: What was that? I  
18 didn't quite follow that?

19 MR. OLSON: Your preference on what to do next?

20 COMMISSIONER MC ALLISTER: Oh, well, are we --  
21 we're basically going to -- we're at lunchtime. We're  
22 only about 10 minutes past the agenda, so I'd count that  
23 as success for sure.

24 MS. KOROSSEC: Absolutely, for an IEPR workshop,  
25 yeah.

1           COMMISSIONER MC ALLISTER: Yeah, exactly. But  
2 thanks again. I neglected to thank the staff on the  
3 IEPR, Suzanne and her team, and Lynette, et cetera. I  
4 mean you guys just always do such a good job of keeping  
5 it tight, but also substantive. So, I want to just  
6 commend you again.

7           And I am going to actually step out. I have a  
8 plane to go catch. But Commissioner Scott and Hazel  
9 Miranda, from my staff, is going to sit up here on the  
10 dais representing me in the afternoon.

11           So, I really thank you all for coming and look  
12 forward to seeing what happens in the afternoon, when I  
13 get back.

14           MS. KOROSK: We will take a one-hour lunch. We  
15 will reconvene at 1:15.

16           (Off the record for the lunch break  
17 at 12:13 p.m.)

18           (Reconvene at 1:18 p.m.)

19           MR. OLSON: So, Commissioner are you ready to  
20 start?

21           So, we're going to continue our workshop. The  
22 next two speakers are going to be participating by  
23 WebEx. And a little carryover from the morning, we're  
24 still on a biofuel topic.

25           And our speaker who will join us now is Joel

1 Velasco. He's works for a company called Ameris, but  
2 also an officer or an advisor to the UNICA, which is the  
3 major Brazilian sugarcane association. I think it  
4 represents close to 60, 65 percent of sugarcane ethanol  
5 producers in Brazil, and adding some additional comments  
6 on sugarcane ethanol.

7 So, Joel are you online there?

8 MR. VELASCO: Yes, I am.

9 MR. OLSON: Go ahead and proceed.

10 MR. VELASCO: And just to be clear, I think you  
11 guys have a presentation there that you're following?

12 MS. GREEN: Are you going to control the slides,  
13 Joel?

14 MR. VELASCO: No, you can control it. Sorry,  
15 I'm actually not even sure how do I control it.

16 MS. GREEN: Oh, okay. Hold on for a second.

17 MR. VELASCO: I guess while we -- there we go,  
18 we're getting the slides, at least I'm seeing them.

19 So, just by way of introduction, apologies for  
20 not being there in person, I'm actually just nearby in  
21 Emeryville, California today. But I was unable to get  
22 out to Sacramento in time for the meeting.

23 I'm a Senior Vice President at Ameris, which is  
24 the renewable fuels and chemicals company based here in  
25 the Bay Area, but with extensive business focused in

1 Brazil.

2 As some of you may know, I represented, as the  
3 chief representative of the sugarcane industry  
4 association, UNICA, for several years and was pretty  
5 active in the original LCFS work, and still follow this  
6 very closely.

7 And I retain as an advisor on the board of UNICA  
8 down in Brazil. That's where I'm originally from.

9 There in the room you should have Letitia  
10 Phillips (phonetic), a good friend and the current  
11 representative of UNICA in the United States. And she  
12 obviously can provide and answer some questions you may  
13 have.

14 If you can move to the next slide, let me just  
15 jump right into it.

16 You had a presentation earlier today from Plinio  
17 Nastari, also a dear friend from Brazil, and you've  
18 probably gotten probably the best guy in terms of  
19 sugarcane in the world, or certainly for Brazil to speak  
20 to you.

21 But the reason sugarcane and Brazil are tied  
22 together is because Brazil's number one in that  
23 business. I can say this is Ameris, but also UNICA, is  
24 sugarcane, we believe is the most photosynthetic  
25 efficient crop available in large scale today, and

1 Brazil is the world's largest producer of that crop,  
2 twice that of India.

3 Most of the cane grown in Brazil is actually  
4 concentrated in the south central region of the country,  
5 which also happens to be the most populous area.

6 It's almost as if California had Iowa's soil and  
7 were trying to produce crops. In other words, Sao Paulo  
8 has the population center and the economy, and also the  
9 great land for producing sugarcane.

10 And one of the great things about Brazilian  
11 sugarcane, I think that really makes them distinct is  
12 that they've been growing -- their yields have been  
13 increasing at about 3 percent on an annual basis since  
14 the late 1970s.

15 They have a lot more to go and I'll touch on  
16 that. I think that sense there's some great lessons  
17 that can be taught from U.S. agriculture, but Brazil has  
18 come a long way in this crop.

19 The next slide, please. Sugarcane plays a huge  
20 role in the Brazilian electricity matrix and Brazil is  
21 heavily dependent on renewable energy for its  
22 electricity. Hydro is primarily the source for  
23 electricity generation.

24 But the actual number one source of renewable  
25 energy in Brazil today remains sugarcane, both because

1 of the biofuel, but also because of the cogeneration of  
2 electricity at the plants in Brazil.

3 So, it's really, as you see there, a pretty  
4 diverse energy matrix in Brazil, but with a significant  
5 renewable content.

6 The next slide, please. To just give you a  
7 sense of the industry, as I think was noted earlier we  
8 have -- UNICA represents about 130 producers and mills,  
9 and they're responsible for roughly 60 percent of all  
10 the production in Brazil.

11 And the large, primarily everybody that's  
12 exporting, I would say, is an UNICA member.

13 This year in the industry we estimate Brazil  
14 will produce about close to 600 million metric tons of  
15 raw sugarcane, of which will be processed into about 38  
16 million tons of raw sugar. That is basically half of  
17 the world trade in sugar. Brazil is the world's largest  
18 supplier of sugar.

19 And then they will also produce about 6 billion  
20 gallons of ethanol, which is now less, probably about 40  
21 percent of what U.S. production is, and about 800  
22 million gallons or so that ethanol will be for the  
23 export market is probably the estimate.

24 And as I mentioned earlier, there's a lot of  
25 electricity produced from these mills. These mills are

1 all self-sufficient electricity.

2 The next slide, please. Much of the discussion  
3 around sugarcane and Brazil, there's always sort of this  
4 interest of where is it and what about that Amazon, and  
5 all those beautiful ecosystems Brazil has.

6 I think the key point here to make in this  
7 slide, as you've probably seen before and as CARB  
8 realizes, sugarcane occupies about 1 percent of -- 1 to  
9 1 and a half percent of total land, and we're producing  
10 about 600 million tons per crop here right now.

11 That works out to either, depending on how you  
12 do the math, about half of Brazil's territory, or 2 or 3  
13 percent of Brazil's arable land.

14 And I think one of the fascinating things is the  
15 ability, not just as this crop, but really is the  
16 diverse nature of Brazil's agriculture. People sort of  
17 lose sight of it and when you're talking biofuels, they  
18 think it's all about sugarcane. But Brazil's largest  
19 crop today is and will remain soybean. Basically,  
20 number one producer, sharing that spotlight with the  
21 United States.

22 The second crop tends to be corn. Last year  
23 Brazil exported more corn even than the United States,  
24 largely because of the shortage in the U.S. crop.

25 And Brazil has a lot of cattle. In fact, Brazil

1 has more cattle than people. There's about 200 plus  
2 million head of cattle.

3 The next slide, please. One of the -- and I  
4 know there was a little bit of a discussion about this,  
5 I think in the morning, I was told, but there's always a  
6 lot of concerns about the sustainability of the  
7 expansion of sugarcane.

8 So, people accept that while sugarcane's a good  
9 crop, you can get good biofuels out of it, but can there  
10 be growth and can that growth be sustainable?

11 One of the things I was pretty proud of  
12 participating in during my full time tenure at UNICA,  
13 several years ago, was the slide you're seeing which is  
14 the agroecological zoning in Brazil.

15 The industry went to the Brazilian government  
16 and said tell us, let's figure out where we could expand  
17 the sugarcane growing areas and where would be go and  
18 no-go areas.

19 And through this process what basically the  
20 government did, and what we worked out with them, was  
21 identified areas that were appropriate for expansion and  
22 were not.

23 And the government then did two things. One is  
24 we made those public and people can use that as sort of  
25 part of their investment decision but, more importantly,



1 the government uses this in all of its licensing  
2 processes. All of the banks use this for loaning.

3 And the beauty of it that comes out is basically  
4 there's about 665 million hectares, or about 160 million  
5 acres available for expansion in Brazil which, by the  
6 way is roughly 7 percent of Brazil's land mass.

7 When we think about that and the industry today  
8 occupies one-eighth of that area, so there's quite a bit  
9 of potential growth for the industry.

10 The next slide, please. And this is a slide  
11 that's dear to me, as Ameris as well, because the  
12 industry has been producing sugar and ethanol for many  
13 years. We used to drink most of our ethanol before we  
14 started putting in the cars in Brazil, and then  
15 electricity, as I mentioned.

16 But there's a number of other products. Because  
17 basically anything, all these carbohydrates that are  
18 produced, all these sugars can be converted through the  
19 beauty of some of the great technology we're developing  
20 right here in California into plastics and hydrocarbons,  
21 and so forth.

22 And as Ameris, I'm proud to say we have over 300  
23 buses in Brazil, in Sao Paulo and Rio running on  
24 renewable diesel.

25 California technology produces Brazilian sugar

1 and we hope over the coming years we'll be able to  
2 expand that production and maybe even some here in the  
3 United States.

4 The next slide, please. So the industry is very  
5 diverse and it's got all these great potentials, but we  
6 also have some of what I would say are big challenges  
7 ahead of us.

8 There have been really two major changes over  
9 the last few years that affect sort of the outlook for  
10 the industry.

11 One is we went through a boom, just like in the  
12 U.S. industry in ethanol, and a boom in construction.  
13 That construction boom came to an end and there was a  
14 lot of consolidation in terms of M&A activity.

15 And then we're now -- and we also are going  
16 through a phase of really optimizing production and  
17 sales, and sound logistics, and things of that sort.

18 The next slide, please. The boom can be mostly  
19 evidenced on that new -- you can just click through. I  
20 think there's a couple automations there. Go back,  
21 sorry.

22 The numbers of mills that were coming online  
23 peaked in 2008 and really where we stand now is  
24 basically flat. There's basically no new production  
25 coming in.

1           The next slide, please. And the -- what we've  
2 also seen during this process is an increase in  
3 mechanization. Sugarcane, historically, for hundreds of  
4 years was harvested manually. But thanks to a lot of  
5 technology developments we've been able to improve --  
6 we've been able to actually now put machines to work  
7 there.

8           This has had a great benefit because not only  
9 can you produce more, but you actually improve the  
10 skills of workers and, of course for the local economy  
11 there's great growth in terms of products sold and  
12 things like that.

13          The next slide, please. And during that same  
14 period we've seen considerable improvement, not just in  
15 the mechanized harvest, but also the planting. Planting  
16 used to be manual.

17          And what you've seen, these lines basically  
18 showing you there is that we basically -- as we hit the  
19 crisis in 2008, 2009 everybody stopped renewing their  
20 crops, basically, not working the soil. And that  
21 resulted in a significant loss of yield.

22          But over the last two years there's been an  
23 uptick on that. And so, in 2012 alone \$4 billion have  
24 been invested in improving the soil.

25          And we expect that that, coupled with the

1 machinery for our harvesting is really -- even though  
2 the industry is not growing in the number of mills, the  
3 volumes and the opportunities for additional production  
4 will go up.

5 The next slide, please. And you can click  
6 through that, thank you.

7 And another area that's really, I think, very  
8 important, that's been something very common here in the  
9 United States in terms of logistics, and in Brazil,  
10 really, where most are the costs are associated is that  
11 we've been -- most of the transportation, and as CARB  
12 knows well from their lifecycle analysis, the transport  
13 has been always by truck.

14 By making a lot of these investments over the  
15 last couple years, we now have a pipeline and waterway  
16 transportation for ethanol into some of the main  
17 centers.

18 This is a significant investment, about three  
19 and a half billion dollars over these last three years,  
20 and going through 2017. But much more importantly  
21 they're going to reduce cost and reduction of cost,  
22 especially in the fuels markets, that's going to serve  
23 consumers no matter where they are.

24 The next slide, please. Now, let me turn -- so  
25 I gave you a little bit of a review of where we've been.

1 Now, let me talk a little bit about some export  
2 production.

3           You can move to the next slide. So, back in  
4 2010, if you saw me present at some place, you might  
5 have seen this slide. And back then we had a crop of  
6 about 600 million tons, 602 to be exact, and we produced  
7 about 32, 33 billion tons of sugar. Most of that got  
8 exported.

9           And then, you know, 6.8 billion gallons of  
10 ethanol, of which about 800 million were exported and,  
11 of course, quite a bit of electricity, too.

12           And then as we looked forward to 2020 at that  
13 point, the view was that that industry will grow to  
14 about a billion tons of cane. They would grow a bit,  
15 the sugar market, but the world sugar market is  
16 basically growing about 1, 2 percent a year.

17           And the ethanol biofuel market would grow  
18 considerably, and particularly on the export side, but  
19 also on the domestic.

20           As I pointed out, we had a bit of a financial  
21 crisis in between. A number of things changed.  
22 Presidents in Brazil went, and we got a new president  
23 with a different approach to energy policy in the  
24 current government.

25           And as a result, those projections, then many

1 people questioned whether they're still feasible.

2           The next slide, please. When you look at this  
3 period, and that's really what this chart is showing  
4 you, the increase in tonnage of sugarcane went from  
5 basically 300 million tons all the way to roughly 600,  
6 and stalled over the 2008-2012 period.

7           And we expect that this area of the country will  
8 produce upwards of 600 million tons. And the reality is  
9 the capacity of the industry is right there around 700  
10 million tons or so of raw cane.

11           I think you need to do a click on that slide.  
12 If you look from the export side, the best year that  
13 Brazil had in terms of exports was in 2008, roughly 1.3  
14 billion gallons. About half of that, in general, goes  
15 to the United States.

16           This year we estimate, as EPA I think as come to  
17 a pretty close number, that Brazil exports somewhere  
18 around 800 million gallons of ethanol and, in this case  
19 this year, probably I would venture to say half to two-  
20 thirds of it may well go to the United States.

21           And now this year, I think we already see from  
22 the trade data that Brazil has not only just -- you  
23 know, the first half of the year, which is usually the  
24 quiet part of the year, Brazil had already shipped  
25 upwards of 200 million gallons to the United States.

1           And the trend to be that at least a quarter of  
2   that ethanol is coming into California either via the  
3   Port of Houston, and then trained into Southern  
4   California or, actually, directly by ship with,  
5   obviously, the ship making the crossing in the Panama  
6   Canal.

7           The next slide, please. So, it's important as  
8   you think of projection as to try to understand what is  
9   really driving cane ethanol demand. Where is the demand  
10   coming from?

11           And until now, and probably for the next couple  
12   of years, demand is really -- in cane ethanol is really  
13   driven solely by domestic demand, primarily the flex  
14   fuel vehicles.

15           Brazil, half of their light vehicle fleet is  
16   flex fuel, meaning that it can consume either pure  
17   ethanol in the case of Brazil, or a gasoline, which in  
18   the case of Brazil is at 20 to 25 percent ethanol.

19           And these consumers in these flex fuel cars in  
20   Brazil have learned, and there's even an app for that, I  
21   can share it with you, that they should only buy ethanol  
22   if the price is no more than 70 percent than the price  
23   of gasoline.

24           In 2009, for example, nearly all flex fuel  
25   vehicles consumed only ethanol, but it's considerably

1 less today.

2           Why? Because the government has had a policy to  
3 maintain gasoline prices flat for basically for the last  
4 seven years, largely to control the inflation. The  
5 Brazilian government has the benefit of also owning the  
6 oil company, so they've opted to subsidize gasoline by  
7 importing more expensive gasoline and selling it at  
8 roughly a loss of 50 cents per gallon in the domestic  
9 market because they're trying to control inflation.

10           The result of that though, however, as we  
11 pointed out, is discretion, you know, let people -- if  
12 somebody wants to sell cheap gasoline, even an ethanol  
13 guy is going to say, well, you might as well just buy  
14 it.

15           Unfortunately, that discretion has made the  
16 financial crisis of 2008 have an even bigger impact in  
17 this industry. And that is really what's the challenge  
18 we see in Brazil driving demand.

19           You had a financial crisis, you have a  
20 government who's sort of subsidizing petroleum products  
21 to the tune of right now 50 cents per gallon is sort of  
22 our calculation, and that has really stifled the growth.

23           However, as you look forward, even without sort  
24 of a change in government policy, mind you I do think  
25 the government is going to change, they're starting to



1 see the writing on the wall, the industry will need to  
2 grow to meet demand at home and abroad.

3 And this is why I said until now flex fuel cars  
4 and domestic demand has been driving it, but other  
5 policy signals and other market signals are starting to  
6 change this.

7 The next slide, please. So, what we know for  
8 this year's production is Brazil will produce about  
9 close to 600 million tons of cane and about 35 or so  
10 million tons of sugar. Most of it will be exported.  
11 And they'll produce, let's call it 6 and a half billion  
12 gallons of ethanol, and about 700, 800 million gallons  
13 will be exported.

14 As I said earlier, about half of that is coming  
15 into the United States and about a quarter, at least  
16 year to date, roughly, has been coming in to California.

17 I would expect in the very short term that that  
18 would be the trend. But as we go out to the out years,  
19 into 2020, knowing that the industry is growing, has  
20 grown in the past, it's quite reasonable that it will  
21 grow.

22 And I think here I will say one of the biggest  
23 challenges is ethanol today has always been sold and  
24 continues to be sold in the spot market. There's really  
25 no, at least for Brazilian products, much of a long-term

1 contracting market.

2           And the uncertainty on policies in the United  
3 States, for instance, RFS, and LCFS, coupled with, in  
4 the case of California, I think and unreasonably high  
5 carbon intensity number has really put a cloud over the  
6 outlook for imports from Brazil, or exports from Brazil  
7 into the United States. Nobody's really contracting for  
8 this.

9           And until there's going to be a lot of contracts  
10 or commitment to contracts you're not going to see  
11 increase in production.

12           And so we're sort of at this Catch 22 of having  
13 a policy that you know as the LCFS, as we're going to  
14 need low carbon fuels, but those low carbon fuels aren't  
15 being produced at the quantities necessary because  
16 nobody's quite sure that the policy's going to be there.

17           And I think that is one of the areas I think I  
18 would encourage the Commission to look at.

19           I've been saying this for some time, but the  
20 quicker CARB reduces the carbon intensity of ethanol, as  
21 have other regulators around the world have come to that  
22 conclusion, the more certainty that they will give to  
23 the marketplace that the credits that they are buying  
24 are, indeed, reasonable going forward.

25           And then finally, I think by doing that you're

1 going to be incentivizing the investments in terms of  
2 logistics in the United States, primarily in California,  
3 whether they're going to be in storage in Southern  
4 California, in the ports and so forth, and helping make  
5 that adjustment.

6 And candidly, from a company, from an Ameris  
7 perspective, our technology will depend and our  
8 investments will depend largely on the growth of the  
9 cane industry there. So, our ability to continue  
10 innovating and bringing some of our great technologies,  
11 whether it's produce renewable diesel, or jet fuel, or  
12 some other product will depend on a strong sure gain  
13 industry, which is why I have this sort of perverse  
14 interest of seeing the industry there continue to grow,  
15 even though we're here in California.

16 I will go through the remaining slides very  
17 briefly because I want to -- I think I'm probably  
18 mindful of my time.

19 So, if you go one more, please. Just to remind  
20 you guys, actually, you guys know this, cane ethanol is  
21 -- meets an advanced pool and, you know, through the end  
22 of the 2020 cycle there's at least about 4 billion  
23 gallons of that that would be necessary.

24 Please, the next slide. And we've pointed out  
25 to CARB that to use their methodology -- to EPA, to use

1 their methodology they should have a reduction of about  
2 73 percent. And then EPA came out and came pretty close  
3 to that, I would argue, at 61 percent reduction. So,  
4 definitely sounded very good reduction, as we think it  
5 was reasonable to make.

6 The next slide, please. And this is what they  
7 came up with.

8 The next slide, please. As we look at  
9 California, the next slide, we have -- this is the point  
10 I was making on the iLUC penalty for the -- the carbon  
11 intensity penalty for the indirect land use is about 46  
12 grams of CO2 per megajoule. And that's  
13 disproportionately high. We've shown to CARB that  
14 should be probably as low as in the single digits. And  
15 we would encourage CARB to revisit those numbers sooner,  
16 rather than later.

17 Why, the next slide, is that without that -- I'm  
18 sorry, one more. Without that change, even using the  
19 exaggerated iLUC numbers, we know that blending ethanol  
20 with gasoline in California can help you be compliant,  
21 say 2015 at some point, 2016, maybe. But at some point  
22 it becomes impossible.

23 And since we probably know that these higher  
24 blends that are going to be very difficult in  
25 California, the uncertainty that is created by this

1 exaggerated iLUC factor number makes it -- you know, who  
2 wants to invest in a plant that you're only going to be  
3 selling for a year or two?

4           Who wants to invest in a tankage storage when  
5 you're going to be able to buy a product that's only  
6 going to be stored for a year or so.

7           So, as CARB reviews those numbers, using the  
8 best science available, we believe that those numbers  
9 will come down and the outlook for sugar cane ethanol  
10 imports will improve, and I think that you will see the  
11 investments flow, whether they're in the U.S. or in  
12 Brazil.

13           I don't think there's another slide, but you may  
14 want to check on that. Yep, that's it.

15           I'm happy to take any questions. I do think,  
16 just in terms of summarizing, I do believe the  
17 projections we made back in 2010 are still reasonable.  
18 I think if you look, that Brazil could be exporting  
19 upwards of 4 billion gallons of ethanol by 2022 to the  
20 world.

21           I do think it is reasonable to expect that  
22 Brazil could be exporting about half of that to the  
23 United States.

24           And I think it is reasonable to expect that as  
25 much as maybe half of that could be coming into

1 California during -- by that period.

2 I think the big question is will the demand  
3 really be there? In other words, will the policy be  
4 there and will we be applying the best science that is  
5 available to this.

6 I'm happy to take any questions. And, again, I  
7 apologize for not being there. Letitia, who's in the  
8 room, can also handle some of the questions, as well.

9 COMMISSIONER SCOTT: This is Commissioner Scott.  
10 Thank you so much, Joel, for your terrific presentation.  
11 You actually -- as questions popped into mind, as you  
12 continued talking you would answer them. So, I do not  
13 have any questions.

14 I wanted to note that we have been joined by  
15 Hazel Miranda, who is Commissioner McAllister's advisor.  
16 And do you have any questions?

17 Okay, no, we're good. Thank you for the great  
18 presentation and taking time to call in from the road.

19 MR. VELASCO: Yeah, well, come visit our labs.  
20 There's some really great technology and we're trying to  
21 tackle some of the same challenges I know the Commission  
22 is looking at.

23 MR. OLSON: Very good, thank you, Joel.

24 And now we're going to go on to our next  
25 session, which is electric transportation and hydrogen

1 technology.

2 And our first speaker is also going to be  
3 presenting remotely. His name is David Greene. He's a  
4 principal at the Oakridge National Lab. And he's going  
5 to present some information on his study of analyzing  
6 the transition to electric transportation, some U.S.  
7 wide and then also California-specific.

8 So, David, are you online there?

9 MR. GREENE: Yes, I am. Can you see the slides?

10 MR. OLSON: Yes, we can.

11 MR. GREENE: Okay, very good.

12 MR. OLSON: Wait a minute, we've got the wrong  
13 item here.

14 MS. KOROSSEC: David, you need to pull up the  
15 slides on your machine. You have the control of the  
16 presenting rights.

17 MR. GREENE: Okay. Well, I see them on my  
18 screen so there must be some reason why you're not  
19 seeing them.

20 MS. KOROSSEC: Did you click on share desktop  
21 before you pulled up your slides?

22 MR. GREENE: No.

23 MS. KOROSSEC: There we go.

24 MR. GREENE: Okay, how's this?

25 MS. KOROSSEC: Yes, they're coming through.

1 They're coming in now.

2 MR. GREENE: Okay, very good. Thank you.

3 Well, it's a pleasure to be able to talk to you  
4 about this today. I wish I could be in California,  
5 myself, it's raining here in East Tennessee.

6 But I'm going to talk about the study that my  
7 colleagues and I, at the University of Tennessee's  
8 Howard Baker Center for Public Policy did for the  
9 International Council on Clean Transportation.

10 But as you can see from the slide here, behind  
11 our study is the NRC study on Transitions to Alternative  
12 Vehicles and Fuels.

13 And the reason for that is that we used  
14 precisely the same model used in the Transition Study,  
15 and the same assumptions about technology and behavior  
16 as they used, and the same base case assumptions about  
17 energy, and vehicle sales, and so on.

18 So that we're starting with essentially their  
19 model and assumptions; I was a member of that committee  
20 so this was easy to do.

21 But I think this is useful and good in that it  
22 gives people a well-documented and I think unbiased  
23 basis for the study that we did on the Transition to  
24 Electric Drive in California.

25 So, the purpose of our study was to try and



1    measure the cost and benefits of this transition and to  
2    work towards what we call a new economic paradigm for  
3    energy transitions.

4            It's more than just internalizing externalities;  
5    it's making a large scale energy transition.

6            And questions like: How much is it going to  
7    cost? How big are the benefits? How long will it take?  
8    What role will policies like ZEV mandates play? How  
9    important is the infrastructure? How about the policies  
10   outside of California and the Section 177 states, and  
11   how do we understand the fairly profound uncertainty  
12   that faces any policy looking towards 2050 and beyond?

13           As I said, we used the NRC's model and studies  
14   that's well documented, and the documentation and such  
15   is all available online from the National Academies.

16           The key premise of this study was that the  
17   country continues to require efficiency improvements to  
18   light duty vehicles.

19           Our study, like the NRC study, addressed only  
20   light duty vehicles.

21           And you could see here that although some people  
22   have said the new CAFE standards are required,  
23   unprecedented fuel rates of efficiency improvement,  
24   actually the rates during the 70s and early 80s were a  
25   little faster. But still, these are quite challenging.

1           And our projections used in the NRC study are  
2 very consistent with meeting the 2017 standards and  
3 meeting the 2025 standards.

4           You see on this graph the fuel consumption  
5 metric, gallons per hundred miles on the left side and  
6 fuel economy, which is therefore nonlinear, on the  
7 right-hand side.

8           The next slide shows, in sort of familiar fuel  
9 economy space, what those projections mean for different  
10 kinds of technologies, battery electric vehicles, fuel  
11 cell vehicles, hybrid electric vehicles, and plug-in  
12 hybrid electric vehicles for passenger cars and light  
13 trucks.

14           I say plug-in hybrid electric vehicles, but they  
15 have the same energy efficiency as hybrid electric  
16 vehicles operating in a charge sustaining mode, and they  
17 have the same efficiency as battery electric vehicles  
18 when operating in charge depleting mode. That's the  
19 assumption of the NRC study.

20           This graph is hard to read, but I put it here  
21 for reference. The basic idea is that a key component  
22 of the change that is brought about by the tighter fuel  
23 economy and emissions standards is a reduction in the  
24 power requirements of vehicles.

25           Here, the power reduction is about one-third,

1 from 118 kilowatts to 78 kilowatts in 2050, achieved by  
2 a combination of a 30 percent reduction in the mass of  
3 the vehicle and similar reductions in rolling  
4 resistance, and aerodynamic drag.

5 That's important because the costs of battery  
6 electric vehicles and fuel cell electric vehicles scale  
7 much more directly with the power requirements.

8 And I think the NRC study is the first one to  
9 show how that could result in battery electric vehicles  
10 and fuel cell electric vehicles eventually becoming  
11 cheaper than internal combustion engine vehicles, whose  
12 power train costs, because of the complexity of the  
13 moving parts, and the accessories required, and the  
14 after treatment required eventually become a little bit  
15 more expensive than battery electric and fuel cell  
16 electric vehicles. The costs don't scale quite as well  
17 with the power requirements.

18 So, I think this is a very important finding of  
19 that NRC study. It's thoroughly documented in the  
20 appendices to the study, which as I said are available  
21 online.

22 This is for passenger cars. For light trucks  
23 it's a similar situation. But because the weight  
24 reductions and the other power load reductions are not  
25 as great, the internal combustion engine remains the

1   cheapest option, even in the long run.

2               So, that's a background on the costs.

3               The NRC study also includes de-carbonization of  
4   all types of energy, whether it's electricity, or  
5   hydrogen, or gasoline. And this shows the assumptions  
6   about biofuels.

7               Not ethanol, which we just learned about, but  
8   thermo chemically produced through pyrolysis, drop-in  
9   biofuel that's chemically equivalent to gasoline.

10              And they estimate that it will eventually cost  
11   \$3 to \$4 per gallon. That's more than gasoline, but not  
12   much more in the projections they use from the annual  
13   energy outlook.

14              And the amounts they estimated, there would be a  
15   maximum amount of about 45 billion gallons available.

16              Fortunately, in scenarios in which there's a  
17   substantial amount of electrification, you don't need  
18   anywhere near that much biofuels, and you'll see that  
19   later.

20              A brief description of the Lave-Trans Model,  
21   first of all it's named after the late Charles Lave, who  
22   was an economist at University of California, at Irvine,  
23   a transportation economist.

24              And he and Ken Trane, at UC Berkeley, were the  
25   first to apply discrete choice models to analyze

1 automobile choice. And so this light duty alternative  
2 vehicle energy transition model is named after Charlie  
3 Lave.

4 But those of you who are familiar with these  
5 kinds of model will see down the middle the usual  
6 vehicle sales, stock turnover as the sales are added and  
7 older vehicles are scrapped. Vehicle use estimation,  
8 which includes rebound effect. And energy use, then  
9 greenhouse gas emissions.

10 What's different about this model, one thing is  
11 it includes vehicle choice, which also includes the  
12 effects of things like the willingness of innovators and  
13 early adopters to pay more for advanced technology  
14 vehicles. The risk aversion of the majority who would  
15 need a discount to pay for -- to be willing to buy  
16 advanced technology vehicles, the effective fuel  
17 availability on vehicle choice, the effective diversity  
18 in make and model choice, and so on.

19 These kinds of transition factors are quantified  
20 and can be monetized in the vehicle utility and choice  
21 model.

22 The other factor is the lines you see in red,  
23 which are the positive feedback loops, basically, and  
24 these turn out to be quite important.

25 Increasing vehicle sales produces scale

1 economies, produces learning by doing, reduces the risk  
2 aversion of the majority as more and more vehicles are  
3 sold, and they see that the vehicles work. Energy use  
4 needs to more profitable infrastructure and also,  
5 therefore, greater fuel availability.

6           And these kinds of positive feedback loops are  
7 really important to the process of transition. On the  
8 one hand these are barriers that have to be overcome.  
9 On the other hand, the more you put vehicles on the  
10 road, the more you get people to use them and put the  
11 infrastructure in place, the more you generate these  
12 positive feedbacks which speed up the transition.

13           In this model we've actually linked together two  
14 of these Lave-Trans models, one representing California  
15 and the Section 177 states, and the other representing  
16 the rest of the U.S. What happens in California then  
17 affects the rest of the U.S. with a one-period lag. And  
18 what happens in the U.S. affects simultaneously what  
19 goes on in California.

20           So, if California, for example, puts electric  
21 drive vehicles on the road, helps to get some scale  
22 economies and learning, there's benefit for the rest of  
23 the U.S. which will then spill over. And then as the  
24 rest of the U.S. follows along, that spill over will  
25 come back to California. And that's represented in the

1 way these models are linked.

2           This is a very simple choice structure. People  
3 buy a new car, they don't buy a new car, they can buy a  
4 passenger car or light truck, they can buy one of the  
5 types of vehicles with internal combustion engines, or a  
6 battery electric or a fuel cell electric.

7           It's a highly generalized model. There are only  
8 two geographic regions. There are only two market  
9 segments, innovators and early adopters, and majority.  
10 There are only two types of vehicles, passenger cars and  
11 light trucks.

12           We think this is appropriate at this stage  
13 because there's a lot that we don't understand very well  
14 about how this will work. How many innovators are  
15 there? How many early adopters? The majority, what are  
16 they willing to pay? How does that change as more  
17 vehicles are sold?

18           These things are not as well understood as they  
19 really need to be. The same for the cost of limited  
20 fuel availability, the short range for electric vehicles  
21 and long recharge times, and so on, and so on.

22           It's not that we don't know anything and there  
23 is good research going on, improving our understanding  
24 as we go along, but I think it means that the results of  
25 this modeling exercise should not be considered

1 definitive, but rather a way of organizing the best  
2 available information we have in a structured framework  
3 for trying to learn about how this process may work.

4           Okay, so just quickly looking at some of the  
5 inputs to the model, these are the prices for gasoline  
6 and for electricity. They come from the Annual Energy  
7 Outlook. No big surprise there.

8           One thing you'll see is that the blue line,  
9 which is no tax cost, diverges from the red line, which  
10 is a taxed fuel, because in all of the cases, and we're  
11 following the NRC study here, the motor fuel tax is  
12 indexed to the average efficiency of all the vehicles on  
13 the road.

14           And because the efficiency of the vehicles is  
15 tripling, or more, the tax also increases substantially  
16 such that by the time we get to 2050, although the  
17 vehicles are paying the same amount of road tax per  
18 mile, they're paying about \$1.40 to \$1.50 a gallon  
19 gasoline equivalent.

20           All types of energy are taxed in a road user fee  
21 which helps, obviously, to hold down the rebound effect  
22 and helps to finance the road system at the same time.

23           You see a high price for hydrogen initially and  
24 this is just one realization that's sensitive in the  
25 model for how fast the demand for hydrogen expands.



1           But it starts out at a very high price and as  
2 demand expands and the volume of production goes up it  
3 comes down.

4           And you see, again, the cost of de-carbonizing  
5 the hydrogen is in there. And all of the cases I'll  
6 show are for substantially de-carbonized, eventually,  
7 hydrogen and de-carbonized electricity.

8           Important policies assumed and then I'll get on  
9 to results. As I said, increasingly strict fuel economy  
10 and emission standards, policies to ensure low carbon  
11 fuels, gradually occurring over time.

12           And we assume that the existing vehicle  
13 subsidies terminate after 2015. That's probably not  
14 going to happen but on the other hand that's when we  
15 impose the policies like ZEV, and other subsidies and  
16 mandates that ensure that infrastructure is put out and  
17 reduce the cost of vehicles to the customers.

18           And we track all of those costs, so if there are  
19 continuing policies they're sort of in those policies  
20 that are implemented after 2015.

21           We take our ZEV requirements from ARB estimates.  
22 Of course, there's more than one ARB estimate but this  
23 is the one used -- well, the one we used is shown in  
24 detail in our study.

25           I just show here that the assumptions about fuel

1 cell vehicles in this ARB assessment are much lower  
2 than, for example, expected by the California Fuel Cell  
3 Partnership, and we are using the ARB estimates.

4           We ran six scenarios. I'm going to focus on  
5 three of them. Basically, they differentiate by what  
6 are the policies in California and the Section 177  
7 states, what are the policies in the rest of the U.S.  
8 and the rest of the world, how fast does technology  
9 progress and is hydrogen infrastructure put in place  
10 ahead of time.

11           And, really, it's only worth looking at the  
12 first three because the first four -- the last four are  
13 very simple and I'll show why as we get there.

14           So, scenario one is California and the 177  
15 states plow ahead with ZEV mandates and associated  
16 infrastructure deployment. The rest of the U.S. doesn't  
17 do anything. The rest of the world doesn't do anything.

18           In section two the U.S. adopts the same kinds of  
19 policies as California, with a five-year lag, but as  
20 you'll see they don't need to be as stringent because a  
21 lot of the heavy lifting will have been done by  
22 California and the Section 177 states.

23           And in the third one the U.S. doesn't do  
24 anything about promoting a transition to electric drive  
25 vehicles after 2015, but the rest of the world does, and

1     so we want to see how that works.

2                 So, kind of a zero scenario, with nobody doing  
3     anything after 2015. Because the battery electric  
4     vehicles eventually become cheaper than internal  
5     combustion engine vehicles and because they're certainly  
6     cheaper to operate, they eventually take a fairly large  
7     share of the market, and you see that here.

8                 But no plug-in vehicles and no fuel cell  
9     vehicles.

10                This shows with the ZEV mandates and with  
11     infrastructure for hydrogen vehicles, just 68 stations  
12     put in place by 2015. You'll get a much bigger response  
13     in terms of there being a substantial number of plug-in  
14     hybrid electric vehicles and, eventually, a much bigger  
15     market share for all electric drive vehicles.

16                And, certainly, the battery electric and plug-in  
17     electric vehicles come in sooner. That helps the rest  
18     of the U.S. which had similar results in the zero  
19     scenario to California and the Section 177 states.

20                But with these efforts by California and the  
21     Section 177 states, the plug-in vehicles come in much  
22     faster in the rest of the country

23                Now, if the U.S. puts in hydrogen  
24     infrastructure, as well, even without additional  
25     subsidies for fuel cell vehicles, fuel cell vehicles

1    come into the marketplace after 2035 in a significant  
2    way.

3               And that's because the ZEV standards have  
4    essentially done the heavy lifting of driving down costs  
5    through scale economies, and learning by doing, getting  
6    some makes and models out there, and then the rest of  
7    the country benefits from that. And as soon as they put  
8    out some infrastructure, things do begin to happen.

9               And that's an example of the kinds of tipping  
10   points that occur in these phenomenon. It's a small  
11   change, a small investment of a couple of hundred  
12   hydrogen stations in the rest of the country and  
13   transforms not only the U.S., but California as well.

14              Do I know that that's exactly the way it's going  
15   to happen? No, I'm not saying that.

16              But what I am saying is that the processes like  
17   this do have tipping points that can be very strong  
18   because of the positive feedbacks.

19              In the scenario two, which is sort of our  
20   reference scenario, if you will, for policy, California  
21   and the 177 states lead, the rest of the U.S. follows  
22   along.

23              And by the time we get to 2050 almost all of the  
24   vehicles being sold have some form of electric drive,  
25   whether hybrid plug-in battery, or a fuel cell. And

1 this is true not only in California and the Section 177  
2 states, but in the rest of the country as well, with a  
3 slight lag.

4 This has tremendous impact on petroleum use and  
5 greenhouse gas emissions, 80 percent -- almost an 80  
6 percent reduction, about a 78 percent reduction in  
7 greenhouse gas emissions.

8 And nearly an elimination of petroleum use with  
9 only 4.6 billion gallons of biofuel in California and  
10 the Section 177 states in 2050, a huge impact.

11 Benefits appear to exceed costs by about an  
12 order of magnitude. On the left you see the -- a trace  
13 over time. This is a discounted value, but year by  
14 year, by year. So, the future years are discounted. We  
15 use a 2.3 percent discount rate.

16 You see in the purple line fairly substantial  
17 implied subsidies. These are not necessarily subsidies  
18 paid by the government. In fact, the ZEV standards in  
19 effect will require the manufacturers to subsidize the  
20 vehicles, if necessary, in order to sell them.

21 But you see that occurring for about a decade.  
22 There are -- there is a negative net present value,  
23 that's the light blue line, for about a decade. And  
24 then the result turns very positive with net present  
25 values exceeding the net present cost by about an order

1 of magnitude.

2           And for the rest of the U.S. the situation is  
3 even better because, as I said, California and the 177  
4 states in this scenario have done most of the heavy  
5 lifting. And in the rest of the country they get mostly  
6 benefits and very little cost.

7           What happens if the rest of the world goes ahead  
8 with the transition to electric drive? This is the  
9 scenario we assumed. It's not a complete or wholesale  
10 transition to electric drive, but it is consistent with  
11 some studies done by the IEA on transitions at the  
12 global level, and that's where we took this from.

13           So, we see some fuel cell vehicles, some battery  
14 electric, plug-in, and lots of hybrid vehicles, and  
15 still some ICEs.

16           Okay, so that's exogenous to our model and now  
17 we want to see what if the U.S. doesn't do anything to  
18 promote electric drive, but California does?

19           And then we see there's still a substantial  
20 transition to electric drive vehicles in California.  
21 The hydrogen fuel cell vehicles don't do quite as well  
22 as they would if the U.S. were also pursuing hydrogen  
23 fuel cell vehicles. And there are no hydrogen fuel cell  
24 vehicles outside of California and the 177 states  
25 because there's no infrastructure constructed in the

1 rest of the U.S.

2           However, again, just install a small amount of  
3 infrastructure in the rest of the U.S. to get the ball  
4 rolling and, bang, the fuel cell vehicles make a very  
5 large impact, and much sooner.

6           So, that's the -- this illustrates the  
7 importance not only of what goes on in the rest of the  
8 world but -- I mean not only what goes on in the rest of  
9 the U.S., but what goes on in the rest of the world,  
10 driving scale economies, learning by doing, and creating  
11 greater diversity of makes and models.

12           As I said, the last three scenarios are not all  
13 that interesting. Scenario four is nobody builds any  
14 hydrogen infrastructure anywhere in advance of sales,  
15 and that means the hydrogen fuel cell vehicles never get  
16 going.

17           In scenario five we have better technology.  
18 It's like scenario one. It's not as good as scenario  
19 two because the U.S. didn't do anything, but it is an  
20 improvement on the scenario one.

21           And in scenario six we have scenario two, which  
22 is the U.S. follows California and this shows the  
23 resulting impacts of better technology. This is the  
24 optimistic technology assumptions of the NRC study. And  
25 petroleum use is essentially eliminated. And greenhouse

1 gas emissions are reduced by almost 90 percent; better  
2 technology, better transition. It sounds like a pizza  
3 advertisement.

4           Anyway, I think there's some interesting results  
5 from this. As I said, it's not definitive but I think  
6 we do see some broad patterns emerging.

7           One, the net benefits of the transition seem to  
8 exceed costs by an order of magnitude. That's assuming  
9 the technology follows what the NRC study calls their  
10 mid-range projection.

11           But you do need subsidies and you do have to go  
12 through a period of negative value.

13           There are tipping points and these tipping  
14 points can be very important. Obviously, we don't know  
15 exactly where they are.

16           There are not only barriers, but there are  
17 network external benefits produced by people who adopt  
18 advanced technology, electric drive vehicles. They help  
19 make the infrastructure more economical. They help  
20 achieve scale economies. They help achieve learning by  
21 doing. They help break down the risk aversion of the  
22 majority.

23           All of these things are very important, positive  
24 feedback mechanisms, network external benefits that  
25 accrue to the rest of the population.



1           And if you don't have mandates or subsidies,  
2   these transitions don't appear to happen. And if you  
3   don't have hydrogen infrastructure in advance, you don't  
4   get the hydrogen fuel cell transition.

5           And, certainly, it's rather obvious but what  
6   happens outside of California strongly affects what  
7   happens in California.

8           So, we are working on a phase two of this study.  
9   Those were the results from phase one.

10          We're looking at the timing of policy actions  
11   and how that matters. We're looking at the intensity of  
12   policy actions and how much that matters. And we're  
13   looking in greater detail at the question of uncertainty  
14   and how that affects decision making, if one is risk  
15   adverse or not risk adverse.

16          So, that concludes my remarks. And these are  
17   some reports where there's further information  
18   available.

19          COMMISSIONER SCOTT: Hi David, this is  
20   Commissioner Janea Scott. Thank you so much for that  
21   terrific presentation. I actually have lots, and lots,  
22   and lots of questions, but I know we don't have a ton of  
23   time.

24          So one question, I see here your list of  
25   resources, does that include a summary or a report of

1 the phase one information that you just outlined for us?

2 MR. GREENE: Yes, the first report there, the  
3 Baker Center Report that is a summary of the information  
4 I just presented.

5 COMMISSIONER SCOTT: Okay, terrific. And I'm  
6 wondering if you have anywhere in there some summary  
7 slides, because it was pretty interesting when I look at  
8 kind of slides -- I mean all of them, really.

9 But let's see, it's 9 on mine, so it must be  
10 page 18 or page 19 in the overall total of zero emission  
11 vehicles that you would have, right. So, if they're --  
12 let's see which one did you -- if they're additive, you  
13 could add the 30 percent of battery electrics to the  
14 almost 20 percent, and then 15 percent. And that's  
15 actually a pretty large chunk of the market overall.

16 MR. GREENE: Yes.

17 COMMISSIONER SCOTT: And in the scenarios on  
18 some of the other pages it's around maybe 65 percent, or  
19 75 percent, kind of depending on the different policies.

20 And do you have summary slides within the  
21 broader report where we can kind of see what it looks  
22 like when it's aggregated that way?

23 MR. GREENE: Well, we have some, but if we don't  
24 have what you're looking for we do have that data  
25 available and I'd be happy to send it to you.

1 COMMISSIONER SCOTT: Excellent, thank you.

2 And then I have one more and then I'll take time  
3 to look through the report.

4 On slide 22 you mention that there are some --  
5 the subsidies, it looks like a purple line on the chart  
6 that we have, and I'm wondering what the assumptions are  
7 that go into those subsidies.

8 Are those subsidies sort of shared across  
9 California and the Section 177 states? Are those  
10 subsidies mostly coming from California, with a little  
11 bit from the 177 states? What are the assumptions that  
12 go into that subsidies line?

13 MR. GREENE: Yes, so we are not actually  
14 breaking that out and we don't -- we're not able in the  
15 model to break out state by state.

16 You could try to do such a thing based on  
17 another assessment of, you know, how many of each kind  
18 of vehicle would be sold in the different states.

19 I think that, you know, because the travel  
20 provision essentially is going to, I think, help the  
21 sales in California more than elsewhere, most of the  
22 subsidies for fuel cell vehicles would be in California,  
23 but the rest of the vehicles would be distributed  
24 throughout those states.

25 COMMISSIONER SCOTT: Uh-hum.

1           MR. GREENE: The model also doesn't say who pays  
2 for these subsidies. So, it could very well be that the  
3 subsidies are paid by manufacturers, who are required to  
4 sell the vehicles in California. And that doesn't  
5 necessarily mean that the subsidies would be borne by  
6 Californians, entirely.

7           So, it's not something that our model tries to  
8 sort out in detail at this point.

9           COMMISSIONER SCOTT: Okay, now that's very  
10 helpful. Thank you so much for taking the time to WebEx  
11 in and share this information with us. It's really  
12 interesting. I think it's a terrific presentation.

13           I don't know if Jim or Hazel, any questions?  
14 Okay.

15           MR. GREENE: Well, you're quite welcome.

16           MR. OLSON: Okay, thank you very much David.  
17 We'll be in touch with you on maybe getting additional  
18 information from you.

19           And now I'd like to turn to our next speaker,  
20 who is Eileen Tutt, Executive Director of the California  
21 Electric Transportation Coalition, and she will give us  
22 some comments on updated electric transportation options  
23 that her members are involved in.

24           MS. TUTT: Well, thank you Tim and Commissioner  
25 Scott, and Energy Commission staff.

1           My name is Eileen Tutt and I'm with the  
2 California Electric Transportation Coalition.

3           For those of you who are not familiar with our  
4 organization, we're an organization made up of  
5 automakers and utilities, so we are an industry  
6 organization, an industry coalition.

7           But we are in support of electrification of the  
8 transportation sector, broadly, because of its  
9 environmental and economic benefits.

10           So, we're interesting in that we do a lot of  
11 work with the environmental groups. And throughout the  
12 day I've heard a number of things that I agree with.  
13 And I think that Dr. Greene's presentation was  
14 particularly helpful.

15           I want to start out with just some of the  
16 benefits of electricity as a fuel because I think some  
17 people don't -- aren't really aware of some of the  
18 benefits that are not as well understood.

19           I think we all know that electricity, when used  
20 in vehicles, reduces greenhouse gas emissions by about  
21 75 percent and criterion toxic pollutants by over 90  
22 percent.

23           But what you may not be aware of is that these  
24 cars get cleaner, these cars, and trucks, and trains and  
25 anything else that uses electricity, they get cleaner

1 over time as the grid gets cleaner.

2 And that's a very valuable benefit. And I want  
3 to -- I know that Robert Bienenfeld from Honda would  
4 agree with me, and since he's not here you can just all  
5 believe it, but earlier he made a statement about how  
6 similar fuel cell vehicles are to gasoline vehicles,  
7 conventional vehicles.

8 And I think, you know, perhaps that's true, but  
9 I think he would agree there's a lot of customers, and  
10 myself being one of them, having driven an electric  
11 vehicle for the last 11 years, I like my electric car  
12 because it's not the same as a conventional vehicle.

13 I love being able to charge at home. I really  
14 don't like going to gas stations. There's a lot of  
15 benefits that make this vehicle more valuable to me.  
16 So, I think that's true of natural gas vehicles, of fuel  
17 cell vehicles, of all of the vehicles.

18 So I think, I just don't want you all to leave  
19 today thinking that our goal is to make a vehicle that's  
20 just like the conventional vehicles today. In fact, I  
21 think quite the opposite.

22 One of the benefits -- Suzanne showed me but I'm  
23 technologically challenged.

24 One of the obvious benefits, and Dr. Greene  
25 alluded to this, is just the cost of electricity. On

1 this chart it's the blue line at the bottom. Not only  
2 is electricity significantly cheaper than gasoline, at  
3 about \$1.50 a gallon equivalent, but the red line is the  
4 price of oil and the volatility in that price.

5 And you probably can't see it, but a lot of  
6 those spikes are associated with negative economic  
7 consequences.

8 And that's not to be -- you know, to be a  
9 dispersion upon oil, because I know there's talk about  
10 imported oil and wanting to get off oil, and I think we  
11 want to -- the real goal is to diversify the  
12 transportation fuel sector which has zero diversity  
13 right now.

14 And because of that our entire economy is tied  
15 to the fluctuation in oil prices, and that's just not  
16 healthy.

17 So, the degree to which we can get more  
18 electricity, which are the blue lines, significantly  
19 cheaper and the price is relatively stable, into the  
20 transportation fuels market we're going to see economic  
21 benefits quite clearly.

22 The other thing that I will say is that  
23 electricity as a fuel is unlike liquid fuels, and really  
24 unlike something like hydrogen and natural gas in that  
25 the users are connected to each other. How I use

1 electricity affects everyone who uses electricity.

2           And that's a huge benefit. So, if we look at  
3 the vehicle, whether it's a truck, or a train, or a car,  
4 and the electricity grid as a whole, there are ways to  
5 leverage the benefits to the advantage of the consumer,  
6 and I think we want to do that.

7           Finally, I just want to point out that  
8 electricity is a very, very highly regulated fuel. And  
9 that's good because how the utilities make money and  
10 spend money is transparent to all. Your pricing, the  
11 price you pay for electricity, you have a venue to  
12 complain about it and the utilities are held  
13 responsible, and there are hearings, and there's all  
14 kinds of things.

15           So, I guess the economic benefits and the  
16 stability of that price translates to a consumer benefit  
17 that is unique to electricity.

18           I do want to talk a little bit about the market  
19 status of electric vehicles. And Philip talked about it  
20 this morning a little bit, and he's right, so I'm going  
21 to reiterate that.

22           Electric vehicles in California are selling at  
23 three times the rate they are anywhere else.

24           And I think that's a testament, to be honest,  
25 Commissioner, to California policies and the people of



1 California. We care about the environment, we're not  
2 technology adverse.

3 But, really, the policies of the State are  
4 significant drivers.

5 Beyond that the vehicles, plug-in electric  
6 vehicles are selling at three times the rate that  
7 conventional hybrids did when they first came out, which  
8 I think is -- again, and this is directly to what Dr.  
9 Green said, people have become more comfortable with  
10 electricity as a fuel just because of the use of  
11 hybrids, and hybrids being in the market, even though  
12 they don't plug in.

13 So, we all benefitted from that and we're seeing  
14 the benefits in the market.

15 I like leaving this slide up here for a while,  
16 just in case you all are wondering why I haven't moved  
17 it, yet. I just really like that slide.

18 So, that kind of leads us to an assessment we  
19 did that we also gave to the docket here today, and that  
20 is we looked at just electricity vehicles, just light  
21 duty electric vehicles because we have the most  
22 information on that.

23 If you accelerate the rate of deployment of  
24 light duty vehicles into the market, what does that --  
25 how does that impact the economy?

1           And, you know, you can kind anticipate, like I  
2   said there's sort of intuitively diversification of the  
3   transportation fuel sector is a good thing, a lower cost  
4   fuel is a good thing. All of those things are  
5   intuitive.

6           But UC Berkeley did this work for us using a  
7   model called the BEAR model, not surprisingly, that has  
8   a very good reputation. It's been peer reviewed. It's  
9   been used for a lot of California policies.

10          And we looked at these three different  
11   scenarios. One was sort of the reference case or  
12   baseline and then we looked at what if you deployed  
13   electric vehicles at a rate so that 15 percent of all  
14   new vehicles sold in 2030 were plug-in electrics, and  
15   then we looked at a more accelerated rate of 45 percent  
16   of all new vehicles being plug-in electric vehicles by  
17   2030.

18          And these roughly correlate to the -- the 15  
19   percent is roughly correlated to the ZEV mandate, the 45  
20   percent is roughly correlated to the 80 percent  
21   greenhouse gas reduction goal that we have for 2050.

22          So that's where they -- it's not really intended  
23   to be support for the mandate or the programs, but we  
24   did want to correlate it with State policy on some  
25   level.

1           And what we found here, and I should have  
2 actually fixed this slide because we actually don't know  
3 down to the single digit places how many jobs are  
4 created, but it is a macro economic model.

5           But what we found is that gross State product  
6 grew, which is a good thing, as the number of electric  
7 vehicles, plug-in electric vehicles increased.

8           And that jobs also grew. And you'll see about  
9 50,000 new jobs in the 15 percent scenario and about 45  
10 percent new -- I'm sorry, 100,000 new jobs in the 45  
11 percent scenario.

12           And a lot of people ask, and I'm sure you're  
13 dying to know, why isn't this a linear -- why isn't this  
14 line linear? Why is it twice as much and not three  
15 times as much when you go from 15 percent to 45 percent?

16           And the reason, again, hearkens back to what Dr.  
17 Greene said, and that is that we assume incentives go  
18 away over time. And so in the early years the  
19 incentives basically are a stimulus for jobs and  
20 economic wellbeing.

21           And so you'll see that as the incentives go away  
22 we still get jobs growth, no question about that. But  
23 the incentives in the early years really do -- are  
24 really good for our economic wellbeing and jobs growth.

25           So, please, AB 118, let's pass SB 11, AB 8,

1 let's increase the number of incentives available, which  
2 is my next pitch here. But these are very important  
3 programs.

4 In terms of just the employment effects and I  
5 don't really -- I don't know why I included this slide,  
6 but it's so simple in a way, which is why I like it.

7 But basically, when you think about jobs  
8 creation this isn't just batteries being built or new  
9 Teslas in California. The reasons that jobs are created  
10 when we move to electrification is twofold, really, the  
11 major reasons.

12 One is that the electricity sector and the  
13 automobile sector create more jobs per dollar spent than  
14 the oil sector.

15 So, when you move your expenditures from a less  
16 job-intensive sector to a more job-intensive sector you  
17 get jobs creation.

18 The other piece is that when people save money  
19 on fuel, they tend to spend that money on entertainment  
20 and healthcare. And those are local industries that  
21 create jobs here.

22 So these are not necessarily direct jobs,  
23 they're more jobs that are created as a result of these  
24 other factors.

25 The blue is -- there is a slowing in job growth.

1    So, I don't want to say job losses because that's not  
2    actually the case. But we do see in the oil industry,  
3    you see job growth does not increase as fast, which  
4    should be anticipated.

5           It's just that because of this transfer, you  
6    know, you create more jobs in other sectors.

7           I'm going to move quickly to the policy drivers  
8    here that I think are really important. And I'm just  
9    going to say that the number one barrier for plug-in  
10   electric vehicles in the market right now is the vehicle  
11   cost.

12           So, the number one way to overcome that barrier  
13   is for the State to provide an incentive that reduces  
14   that up-front cost. And the State does through the Air  
15   Resources Board's Clean Vehicle Rebate Program, and they  
16   also have a heavy-duty vehicle program.

17           And so that -- not only, as I showed earlier,  
18   does that create jobs, but it does help -- it's a direct  
19   message to consumers, the State is going to pay you to  
20   do this thing.

21           And that's a very powerful message. Right  
22   now -- and there's other benefits of that. I'm not  
23   going to go into all of the benefits of these two  
24   programs.

25           But I will say that right now both of these

1 programs -- for the last three years the light duty  
2 program has run out of money.

3 And thank you, Commissioner Scott and Energy  
4 Commission because you've bailed out that program for  
5 three years in a row now. And that's not a sustainable  
6 way to keep moving forward, which is why I'm saying we  
7 need to pass AB 8 and SB 11. But we also need to think  
8 about how we get more revenue into these programs so we  
9 don't rob from other very important work that's being  
10 done here at the Commission.

11 The heavy duty vehicle incentive program ran out  
12 for the first time this year, and that's a big deal  
13 because these -- to be honest, these truck fleets and  
14 all that, they aren't going to buy -- they aren't going  
15 to buy these cars without the incentive.

16 I want to highlight something that Simon  
17 actually said earlier, from NRDC. He said we need to  
18 think about going forward with these incentive programs.  
19 And I think David Greene said it, too.

20 Right now the State has not plan for the  
21 incentives. They don't -- we haven't looked as a State,  
22 as policymakers or as stakeholders of how much -- what  
23 are our objectives? How many vehicles do we need to get  
24 to? What are the costs? When do these incentives taper  
25 off because we don't need incentives in perpetuity?

1 And how do we -- and where's the revenue going to come  
2 from to help us meet our objective?

3 And if our objective can't be met because  
4 there's no revenue, then let's look at what the  
5 objective ought to be.

6 So, we need to do that in a real honest way and  
7 we just haven't done it.

8 So, I'm going to ask today, you know, this is  
9 the IEPR after all, I think it's very important for us  
10 to think about going forward what do we want to  
11 accomplish? What do we need to accomplish it? And is  
12 it possible? And if it's not, let's reset our  
13 objectives or our goals.

14 Let's not keep going forward. Because I'm  
15 telling you right now we're headed off a cliff with  
16 these incentives.

17 So, by the end of the year, suddenly, people who  
18 thought they were going to get money if they bought a  
19 light duty car, or an electric car, or an electric truck  
20 there will be no money there.

21 And there is nothing worse for the market than  
22 that kind of uncertainty. We just can't do it and we  
23 can't continue to raid from the Energy Commission.

24 So we, CalETC, and many of our members, and our  
25 coalition want to work with you at the Energy

1 Commission, and everyone in this room to figure out how  
2 we look at a more sustainable plan.

3           The other thing that I just -- I have to talk  
4 about, of course, is the infrastructure incentives,  
5 because the Energy Commission runs the AB 118  
6 infrastructure incentives.

7           And for plug-in electric vehicles it's been a  
8 great program. And the only thing I would say here is  
9 that we have -- you know, the Energy Commission has been  
10 very thoughtful in how they disperse that money. It's  
11 gone to a lot of like the challenges, multi-unit  
12 dwellings, workplace, that kind of thing.

13           The PUC and NRG came up with an agreement and  
14 the NRG is spending a bunch of money helping multi-unit  
15 dwellings have electric charging. This is very good.

16           But the thing that's kind of overlooked in the  
17 market, that we've learned, is that a lot of people,  
18 myself included, are buying these cars, driving them  
19 home and plugging them in at home, without any home  
20 recharger, we just plug them into the wall, in the  
21 garage or, in my case, carport outlet.

22           So, you don't need, necessarily a charger. If  
23 you're someone like me and you spend most of your time  
24 not driving, which I think is probably most of us, and  
25 your car is parked probably 23 of 24 hours, if not, you



1 know, 20 plus hours. That's plenty of time to get a  
2 charge with a level one charging -- charger.

3 So, for places like airports, hotels, home,  
4 workplace we need to -- we need to really think of this  
5 because it is a -- it's kind of a low-cost, very  
6 efficient way to get electricity into vehicles and it's  
7 good for the grid as a whole, as well.

8 So that's something that I think in terms of  
9 infrastructure there hasn't -- you know, we get excited  
10 about getting public infrastructure out there, getting  
11 fast chargers. And we definitely need those, there's no  
12 question. That does drive the market and more people  
13 will buy the cars if they see the infrastructure.

14 But we need to recognize the benefit of these  
15 low-level chargers, as well.

16 And then, you know, for Mike Waugh I have to say  
17 that the low carbon fuel standard, and for everybody in  
18 this room, is really -- and let me see if I have a --  
19 I'm sure I have a slide on that one. Oh, yeah.

20 LCFS is one of my favorite policies of the  
21 State, the Low Carbon Fuel Standard, because people  
22 often think of it as a biofuels regulation. The Low  
23 Carbon Fuel Standard is driving clean fuels.

24 Electricity happens to be the lowest cost,  
25 lowest carbon fuel available today. And the way the Low

1 Carbon Fuels Standard is structured recognizes that and  
2 rewards that.

3 This policy has -- you know, we started out, I  
4 think, six, seven years ago -- Mike will know better  
5 than I -- remember, but my brain, the last ten years I  
6 get confused about different time scales. It happens.

7 But we started out thinking, having scenarios  
8 that the Air Board created and we all thought about, you  
9 know, that we thought, okay, this is how the Low Carbon  
10 Fuel Standard is going to be met.

11 Well, as you heard from Philip earlier, it turns  
12 out that that may not be the way the Low Carbon Fuel  
13 Standard is going to be met. There's been a number of  
14 sort of disruptive, if you will, in a positive way  
15 surprises, natural gas being one, electricity being  
16 another, renewable diesel being another.

17 And so, now, we're at a place where the market  
18 has innovated in ways we didn't expect. And that, to  
19 me, is a success, a regulatory success.

20 So, I think of the Low Carbon Fuel Standard as  
21 an extraordinarily successful mechanism to really de-  
22 carbonize and certainly reduce the carbon content of our  
23 fuels.

24 So we did, and I'm not even going to talk about  
25 it except to point out the results. You know, we were

1 one of the funders of the study you heard a lot about  
2 from Philip earlier, and we just are very supportive of  
3 the Low Carbon Fuel Standard and believe that it is  
4 doing exactly what it was intended to do.

5 And in case anybody's wondering, it's not  
6 just -- the intention is not just to stick to liquid  
7 fuels, the intention is to get to low carbon fuels.

8 And so, you know, we've been very pleased with  
9 the work that ICF did and we believe that the Low Carbon  
10 Fuel Standard is attainable through 2020.

11 So, we are not concerned about it. We will  
12 continue to work with CARB and other stakeholders as we  
13 go along to see, you know, what new technologies come  
14 out of all of the innovation investment that's  
15 happening.

16 But, you know, like David Greene, we aren't  
17 going to predict the future, we're just going to say  
18 that the nice thing about the Low Carbon Fuel Standard  
19 is it doesn't predict the future, either. It just says  
20 market do what you do, innovate, and give us the lowest  
21 carbon fuel possible.

22 So, I'll just close by saying that there's a  
23 couple of lessons learned that I want to reiterate.

24 One is that for the AB 118 program, as Simon  
25 said, I'll again say -- Simon says, so it must be right.

1           We have to have to have more money for  
2 incentives. We're running low. And so we need to pass  
3 SB 8, SB 11, and AB 8, but that's not going to be enough  
4 to provide the incentives to get where we need to go,  
5 and I think Dr. Greene made that clear.

6           Additionally, we need to have a plan. Because  
7 I'm telling you what's happening for me, when I go over  
8 into the Capitol, or otherwise, and talk to policymakers  
9 is when it looks we don't even know when -- it just  
10 looks like we want more money that is not -- it's just  
11 not a good plan to go in and ask for more and more  
12 money.

13           You have to look out and see how long do you  
14 need the money? When does it ramp down? It's not in  
15 perpetuity.

16           Perhaps electric vehicles need less and less  
17 money, but fuel cell vehicles are coming into the market  
18 and they need more.

19           We need to look at all of these things honestly  
20 and come up with a plan, together.

21           I also just want to reiterate the importance of  
22 level one charging so that we don't -- you know, don't  
23 forget that not only does it make these vehicles more  
24 accessible to more people, but it's less expensive and  
25 it's good for the grid in general, which is good for all

1 electricity users.

2 Of course, the LCFS is working as it's intended.

3 And then my final statement today is going to be  
4 about the PUC. I haven't talked a whole lot about the  
5 PUC proceeding around electric vehicles.

6 But I will say this, you know, the PUC decided  
7 to kind of keep utilities out of the infrastructure  
8 market and they limited the amount of education that a  
9 utility is allowed to do.

10 And I'm not going to say whether that's a  
11 positive or a negative, but I think we need to relook at  
12 that and think about, you know, providing more  
13 flexibility. Because we have seen some market failures  
14 and we have seen some market disruptions that might --  
15 may not have happened.

16 And I think the fact that NRG, largely a  
17 utility, has come in and done some really good work  
18 ought to be looked at. Particularly as we go forward  
19 into the heavy duty market, and the next proceeding at  
20 the PUC is the heavy duty market.

21 And then, finally, I just want to say that --  
22 and this is true of all of the alternative fuels, but  
23 I'm electricity, so the fact that I own an electric car,  
24 and the State gave me money to buy an electric car, that  
25 benefits everyone whether or not you buy an electric

1 vehicle.

2           You're going to benefit from the fact that I  
3 emit zero emissions; they're very low even when you  
4 include the utility emissions, and all the jobs that  
5 were created as a result of my buying that car.

6           So, go out, buy electric, have a great day.  
7 Thank you for the invitation to be here today.

8           COMMISSIONER SCOTT: And thank you for coming,  
9 another terrific presentation.

10          I do not have questions. Do you all have  
11 questions? Okay, no, we're good.

12          MR. OLSON: Okay, thank you, Eileen.

13          The next speaker is Catherine Dunwoody, who's  
14 the Executive Director of the California Fuel Cell  
15 Partnership and she's going to give us an update,  
16 rundown on hydrogen fuel cell electric vehicles and  
17 hydrogen fuel infrastructure.

18          MS. DUNWOODY: Okay, thank you, Tim. And thank  
19 you, Commissioner Scott and members of the CEC staff for  
20 inviting me to discuss fuel cell electric vehicles and  
21 hydrogen today with you.

22          Fuel cell vehicles are on the road today in  
23 California, and they're fueling at a handful of  
24 stations.

25          Our goal at the California Fuel Cell Partnership

1 is to bring fuel cell vehicles and fuel cell buses to  
2 the commercial market.

3 We are a public/private collaboration of auto  
4 companies, energy companies and government agencies that  
5 are all working together towards that goal.

6 So, this is a picture of three customers fueling  
7 at the hydrogen station in Torrance. And I like to use  
8 this slide just to remind everyone of some of the  
9 benefits of the vehicles that we're talking about.

10 Fuel cell vehicles are electric vehicles, but  
11 they don't plug in. They refuel with hydrogen at a  
12 station like this one, in Torrance.

13 They are zero emission vehicles. They go two to  
14 four hundred miles of drive time on a tank of fuel, and  
15 they take minutes to refuel, giving us between 60 and 90  
16 percent reduction in greenhouse gas emissions, depending  
17 on how the hydrogen is made.

18 The car doesn't care how the hydrogen is made so  
19 as we go forward and we move towards more renewable and  
20 low carbon forms of hydrogen, the emissions will be  
21 reduced, similar to plug-in battery electric vehicles.

22 Four -- or five of the automakers have cars on  
23 the road here in California today, and three transit  
24 agencies are operating fuel cell buses.

25 And I just want to say, quite frankly, these

1 cars are great. I drove that red car here today, it's  
2 the Honda Clarity. And if anyone is interested in  
3 having that experience of driving the fuel cell vehicle,  
4 I know Commissioner Scott you had an opportunity when we  
5 had a ride and drive here. But sometimes you just want  
6 another change so, please get in touch with us and we'll  
7 make sure to get you into a car.

8           So, today I want to make three important points  
9 about the potential for market growth of fuel cell  
10 vehicles here in California.

11           Industry and governments are making significant  
12 investments in fuel cell vehicles on hydrogen today.  
13 And it's because this vehicle makes sense.

14           You already heard reference by David Greene to  
15 the National Research Council's study that was published  
16 in March of this year, and their goal was to find  
17 scenarios for alternative vehicles and fuels that would  
18 reduce oil consumption and greenhouse gas emissions by  
19 80 percent, below 2005 levels by 2050.

20           The report identified several vehicle and fuel  
21 scenarios that could achieve these goals and I'd like to  
22 point out that the scenarios that achieved the greatest  
23 reductions all include fuel cell vehicles.

24           And important finding from this report is that  
25 for new advanced technology zero emission vehicles, like



1 fuel cells and battery electric vehicles, to be a  
2 majority of the fleet in 2050 they need to represent a  
3 significant fraction of new car sales by 2035, which  
4 points to the importance of starting now to launch a  
5 market to enable that growth to occur.

6 The report had a lot of findings, a very  
7 important piece of work. I encourage everyone to read  
8 it and gain insights about the different scenarios that  
9 they analyzed.

10 But today I just want to highlight a couple of  
11 points from their fuel cell vehicle and hydrogen cost  
12 analysis.

13 NRC's analysis showed that fuel cell vehicles  
14 can be competitive with other electric drive vehicles at  
15 production volumes of about 200,000 per year.

16 Some people say, well, what does that mean, you  
17 know, 200,000 per year?

18 Just to put that in context, in 2012 Toyota  
19 reports they produced 600,000 Prius', so that's one-  
20 third the last year's production level.

21 With further technology advancements and  
22 improved supply chain costs for a fuel cell vehicle  
23 could be lower than an equivalent internal combustion  
24 engine vehicle.

25 And I think you heard that similar -- you know,

1 it's the same conclusion that David mentioned in his  
2 presentation.

3 Fuel cell vehicles are expected to be equivalent  
4 in range and refueling time to internal combustion  
5 engines, and to be able to give customers the  
6 performance that they're used to having today.

7 Also interesting, looking deeper into the source  
8 of the cost reduction projections is that to look at the  
9 fuel cell system costs. And I added some emphasis here  
10 on their wording that "the primary economy of a scale  
11 occurs at 50,000 units."

12 And so going back to Prius production, that's  
13 like a 12th of the production in 2012, and it's also  
14 about the same number of new vehicles that are  
15 registered in the Bay Area in the first quarter of 2013,  
16 so just to put some scale on that.

17 And this points to the value of ensuring that  
18 fuel stations are available to support a market launch  
19 so automakers can achieve these economies of scale as  
20 quickly as possible.

21 Also, looking at the cost of hydrogen the NRC's  
22 analysis shows that hydrogen can be competitive with  
23 gasoline today, and it could be much less expensive once  
24 fuel cell vehicles are on the road in large numbers, and  
25 we have a true market for this as a vehicle fuel.

1           It's important to note that for looking at --  
2   comparing hydrogen costs to gasoline costs, the fuel  
3   cell vehicle travels two to three times as far as an  
4   internal combustion engine on the same amount of energy.  
5   So, \$10 a kilogram for hydrogen equates to \$4.00 a  
6   gallon gasoline.

7           And in the future, with projects at \$4.00 a  
8   kilogram of hydrogen, that would translate to \$1.60 a  
9   gallon of gasoline

10          So, future vehicle volumes depend heavily on the  
11   infrastructure being available to enable market launch  
12   and ramp up production volumes to achieve these  
13   economies of scale and bring the costs down.

14          And California is working very hard, and through  
15   the Energy Commission. Thank you for your support of  
16   incentivizing the fuel infrastructure to enable this  
17   market launch in the 2015 to 2017 time frame.

18          These are smart investments that represent the  
19   State's commitment and partnership with the other market  
20   participants who are participating here with investments  
21   from the auto companies, and the fueling infrastructure  
22   providers, as well.

23          And as we heard from David, we need to continue  
24   these incentives. They need to be strong and durable  
25   through the transition years and this could be over the

1 coming decade and beyond.

2           So, automakers today are doing their part to  
3 make great vehicles. According to the industry surveys  
4 that were recorded recently by the Alliance of  
5 Automakers, they have invested a combined \$9 billion in  
6 research, development and demonstration for fuel cell  
7 electric vehicles.

8           And they have announced partnerships and  
9 production plans beginning in 2015.

10           But before automakers can begin marketing fuel  
11 cell vehicles to customers, those customers need to know  
12 they'll be able to find fuel where they live, and they  
13 work, and they want to travel for recreation.

14           They have to know that their fuel cell vehicle  
15 is -- the fuel cell vehicle is a no compromise vehicle  
16 as long as there are hydrogen stations available to fuel  
17 it.

18           So, we have a plan, it's our California Road  
19 Map, it was published in 2012, to ensure that those  
20 early market customers can travel and fuel as  
21 conveniently as they do today with gasoline.

22           And it calls for a minimum of 68 stations for  
23 market launch, growing to around 100 to sustain market  
24 growth through that early market transition.

25           And we will be submitting that road map to the

1 docket. But I'm going to go through a little bit of that  
2 here today.

3 But just first to point out that the State and  
4 particularly the Energy Commission has taken a  
5 leadership role in providing cost share for the current  
6 network of stations, and it's supporting the growth of  
7 that network such that with the current funding that's  
8 been allocated and in play we can expect between 25 and  
9 30 publicly accessible hydrogen stations in place by  
10 2015. So, we're almost halfway to our goal.

11 The road map calls for stations to be located in  
12 five early market communities. These were identified  
13 based on a number of different information sources.  
14 Some of them confidential automaker market assessments,  
15 but we were able through the Partnership to get the  
16 automakers to collaborate and to come to consensus on  
17 the areas where they want to see the investments occur  
18 to launch an early market.

19 Also, demographic information, publicly  
20 available sources such as the ARB-CEC Vehicle Survey  
21 results, hybrid and alternative fuel vehicle  
22 registration data, and the geographic distribution of  
23 the Clean Vehicle Rebate Program.

24 So, together this information indicates the  
25 markets where automakers are most likely to find their

1 first fuel cell electric vehicle customers.

2 And then within those communities we worked with  
3 UC Irvine and they used their STREET model to show how  
4 many stations would be needed to provide those customers  
5 in those communities convenient access to fuel. And  
6 they defined convenient as less than a six-minute travel  
7 time to a station.

8 They based their six-minute criteria or tipping  
9 point based on previous optimization research, drive  
10 behavior surveys, and a need to balance the strength of  
11 the network with the cost of the network.

12 So, in those communities this equates to having  
13 hydrogen at 5 to 7 percent of existing gasoline  
14 stations. And at that penetration, the stations can  
15 then support commercial volumes of fuel cell vehicles,  
16 which will then spur throughput and put stations on a  
17 path to achieving a sustainable business.

18 This map shows the initial hydrogen station  
19 network in California and it can put the first 20,000  
20 fuel cell vehicle customers within those communities  
21 within six minutes of a hydrogen station.

22 But you'll notice it also, very importantly,  
23 puts stations in the destination and connector  
24 communities where people need to travel.

25 So, many of those connector communities also

1    become the seeds for the next market cluster. And the  
2    network can then grow from there.

3           The basic premise of the road map is that first  
4    you need to build for coverage. You need to have enough  
5    stations so that customers can get access to fuel.

6           And, initially, that network of stations is  
7    going to be under-utilized. That is that it's going to  
8    have far greater capacity to fuel cars than there are  
9    cars on the road.

10          But through this coverage customers will gain  
11   confidence that they can fuel when and where they need  
12   to, as easily as they do today.

13          But the businesses that are offering this fuel  
14   will need incentives to offset the early operating  
15   losses due to low throughput.

16          Because hydrogen, like all fuels, will be a  
17   volume business and that's how the profits will come in  
18   is when it gets to volume.

19          When 68 stations are in place, fuel cell  
20   vehicles can enter the market in larger volumes and the  
21   station network will then need to expand to provide the  
22   capacity to fuel those additional vehicles, and that is  
23   what will signal a launch of the early commercial  
24   market.

25          Now, as I mentioned California is certainly in a

1 leading role here, but we are not alone. Germany,  
2 Japan, the UK, Korea, Scandinavia all are investing and  
3 have plans to build hydrogen fuel station networks to  
4 support the early market launch.

5 And this is very important to automakers because  
6 they need to have confidence that enough regions will be  
7 ready to absorb the volume that they want to produce  
8 when fuel cell vehicles come to market. And one market  
9 won't necessarily be sufficient for them to achieve  
10 economies of scale.

11 So, at the same time these markets do need to be  
12 focused so that automakers can provide the support that  
13 a new advanced technology vehicle requires.

14 And I would also like to point out here that we  
15 have a new initiative that's been launched at the  
16 Federal level that is called H2USA. And the idea there  
17 is to take what we have done in California and begin to  
18 apply that to other parts of the country in terms of  
19 network planning and preparation for market launch of  
20 fuel cell vehicles in other states. For example, the  
21 northeast and other states that have taken a leading  
22 role in the ZEV program, as well.

23 So, the third point is that ultimately, of  
24 course, the customer is going to decide whether an  
25 advanced technology vehicle and fuel will be successful.



1           The customers must be able to gain value from  
2   their purchase.

3           California's incentives programs, such as the AB  
4   118, and both at the Energy Commission and at the Air  
5   Resources Board are important elements of demonstrating  
6   value to the early customers.

7           And, of course, the automakers and the station  
8   providers have to continue to provide great products,  
9   great vehicles and great stations to make sure that  
10   customers are pleased.

11          And I would say today early customers are  
12   delighted with their fuel cell vehicles, and their  
13   fueling experience, although they certainly want more  
14   places to fuel. That is definitely clear from the  
15   comments we hear.

16          And, you know, based on this we know that fuel  
17   cell vehicles can be a commercial success. All of the  
18   ingredients are in place; performance, durability, cost  
19   reduction potential and affordable fuel.

20          So, the ingredients are there and we need to  
21   continue to work towards launching that early market  
22   with sufficient stations so that the vehicles can come  
23   to market.

24          Supporting the customer value proposition today  
25   will enable that market launch and growth of fuel cell

1 vehicle, along with other ZEVs. And I firmly believe  
2 that fuel cell vehicles will play a big role in  
3 achieving this goal of the Governor's here by 2025, to  
4 have over 1.5 million ZEVs in California.

5 We're working together at the partnership to  
6 reach out to communities to prepare them to become  
7 hydrogen ready, and also to address the remaining  
8 coordination and technical implementation challenges of  
9 getting stations in the ground.

10 And with that I thank you very much for your  
11 time and would be glad to answer questions.

12 COMMISSIONER SCOTT: Thank you for that great  
13 presentation.

14 I did have one question for you in terms of  
15 the -- you mentioned a few slides back about California  
16 having a leading role in helping to get the fueling  
17 stations out there, and you listed several other  
18 countries, like Germany, Scandinavia, Korea, Japan and  
19 the UK.

20 And I'm wondering if you have had an  
21 opportunity, or maybe some of the members of the Fuel  
22 Cell Partnership to trade information and data, and sort  
23 of share lessons learned about the early experiences  
24 that were having here in California with folks and the  
25 early experiences they're having setting this up there?

1 MS. DUNWOODY: Yes, in fact we collaborate quite  
2 regularly through both in-person and, you know, remote  
3 communications on many of the challenges.

4 For example, there was a meeting recently in  
5 Germany, which one of my staff was able to attend on the  
6 technical infrastructure challenges, and we did talk  
7 extensively about the metering issue, and need for  
8 advanced meter development.

9 So, there's quite a bit of collaboration. And  
10 we face many of the same challenges.

11 And I think, you know, as I like to say it's,  
12 you know, the technical challenges are actually --  
13 they're quite achievable or manageable compared to right  
14 now, really, the business challenge and the fact that,  
15 you know, there is no clear initial business case for  
16 private investment to come in on its own to build these  
17 stations which is why the government investment, through  
18 the incentive program, is such an important market  
19 driver in this early phase.

20 COMMISSIONER SCOTT: Thank you for that.

21 And I know Commissioner McAllister mentioned  
22 before lunch that he had enjoyed his opportunity to ride  
23 in a fuel cell car. I also did when you brought the  
24 cars over before our June business meeting. And it was  
25 great because I got to ride in one that was both where

1 they had sort of swapped out the internal combustion  
2 engine and put in a hydrogen, and also one that had been  
3 designed from the ground up to be a hydrogen car, a fuel  
4 cell car. And so it was just a great opportunity for us  
5 to get to experience those. So, thank you very much for  
6 bringing those over.

7 MS. DUNWOODY: Thank you.

8 COMMISSIONER SCOTT: Okay, thank you.

9 MR. OLSON: Okay, we're going to go to our final  
10 speaker in this electric transportation hydrogen  
11 section.

12 And to give you a little bit of a frame of  
13 reference, when we were doing our assessments of what  
14 the contributions are for different electric drive type  
15 of applications, electric vehicles are expected to be a  
16 large part of that.

17 But we think the next largest contributor or  
18 user of electricity in the full build out of the system  
19 will be the high-speed rail project in California.

20 And as leading to our next speaker, is Mark  
21 McLoughlin, who is the Director of Environmental  
22 Services for the California High-Speed Rail Authority.

23 And Mark, I think you're going to speak up --

24 MR. MC LOUGHLIN: Thank you very much. Again,  
25 Mark McLoughlin, I'm the Director of Environmental

1 Services for the California High-Speed Rail Authority.

2 I'm here today, I'm going to give a short  
3 presentation, an overview of the project, and we'll  
4 present our current assumptions on our load forecasts,  
5 and also note a few areas where the Authority is  
6 stressing the use of renewable energy throughout the  
7 program and, specifically, in our first construction  
8 project.

9 Today, also here is Christine Schutt, of our  
10 Legislative Office, and also Meg Sederoth (phonetic), of  
11 Parsons Brinckerhoff, and our PM key program management  
12 team.

13 And Meg has played a strong leadership role in  
14 the architect of our sustainability program.

15 So, this map right here shows the overall  
16 project on a program level. Right now the high-speed  
17 train system will connect California cities with clean,  
18 fast, modern passenger high-speed rail in a full system.

19 The trains will be fully electric and capable of  
20 over 200 miles per hour at full speed.

21 This will carry the passengers from the growing  
22 populations of the San Francisco Bay Area to the L.A.  
23 Basin in under three hours.

24 So, the way this map is set up, it's currently  
25 set up for our latest 2012 business plan that was

1     adopted just last year.

2                 This took a strong look at implementing the  
3     system in phases, much like how Germany, and Japan, and  
4     France have implemented their systems.

5                 A couple of things we'd like to focus on is on  
6     the initial operating section which in 2022 will connect  
7     major population centers in the Central Valley and fill  
8     the existing rail gap between Bakersfield and the San  
9     Fernando Valley.

10                And a couple key milestones to note, also, is  
11     that the first environmental document for Merced/Fresno  
12     was certified in May of 2012. Our first construction  
13     package, which we call CP1, for the Merced to Fresno  
14     section, the execution of that contract is imminent with  
15     design, and possibly early construction by late this  
16     summer.

17                So, we're very excited about that key milestone  
18     as we get underway with construction.

19                That first contract package is roughly a little  
20     over \$930 million.

21                And the next environmental document that we have  
22     currently, that we're looking to get certified for the  
23     EIR/EIS is in probably spring of 2014 for Fresno to  
24     Bakersfield.

25                Right now the project is moving forward in our

1 preferred alternative phase and working out specifically  
2 some issues on the alignments in the Wasco/Shafter area,  
3 and Bakersfield.

4           We want to make sure that the stakeholders in  
5 this area -- they have strong opinions on the project  
6 and we want to make sure we can address the project  
7 through those communities, whether those are large or  
8 small.

9           A couple notes, also, is the early investment  
10 commitments that the Authority has made, specifically to  
11 CalTRAN in the San Francisco Peninsula for  
12 electrification and Metro Link, also in the South area.  
13 And again, the initial operating sections, Merced to San  
14 Fernando Valley, and the Beta Basin of San Jose to San  
15 Fernando.

16           Phase one blended again, San Francisco to L.A.,  
17 Union Station to Anaheim, a little over 500 miles.

18           Phase two portion of the project is really  
19 Merced to Sacramento, and then L.A. to San Diego.

20           Also, the system will also expand from these  
21 ends, you know, the Bay Area and then the Southern  
22 California to connect the Bay to Basin in 2026.

23           And finally, the full phase one blended system  
24 by 2029.

25           So, roughly over 15, almost 20 years to build

1    that first section and it's quite daunting as you look  
2    at the overall system is about plus or minus 40 years by  
3    the time it's all done.

4           And the main goal is to close that gap in that  
5    L.A. Basin over the Tehachapi's and that section alone,  
6    the tunneling in that Bakersfield to Palmdale area, will  
7    take plus or minus nine to ten years. So, it's a kind  
8    of a daunting project.

9           Let's see, I'll move on here. Here's what we  
10   came -- I want to get to the part of why we're here  
11   today. I want to talk about the current load forecast  
12   for the high-speed rail system. We have the initial  
13   operating segment, the Basin to Bay, and then phase one  
14   blended.

15           Our electric system will provide traction power  
16   that enables safe, efficient and reliable operation of  
17   the trains per the current operation plan.

18           We will have 12 trains per hour, per direction,  
19   including 12 south and 12 north.

20           As this slide shows, we have forecasts of the  
21   gradually increasing load for traction power in time for  
22   the geographic phases and in tune with the way ridership  
23   ramps up or gradually increases as phases of services  
24   are introduced.

25           Also, I wanted to note also that the Authority



1 is engaged with PG&E in Northern California, and  
2 Southern California Edison, currently, also with the  
3 CPUC on providing power to those northern sections and  
4 in the geographic area of Edison.

5 One of the things right now is to get over the  
6 Tehachapi's. There's currently not a source of power  
7 there so we have to build that power to supply that, and  
8 we're working with the resource agencies on bringing  
9 through a green field area, so to speak, in those  
10 Tehachapi's.

11 So for some details, we grow from .4 gigawatt  
12 hours per day in 2022 to 2.3 gigawatt hours per day in  
13 2029 when the full phase one blended system is in  
14 operation.

15 We have been coordinating with the Energy  
16 Commission so that detailed assumption within these high  
17 level numbers we're presenting today are incorporated in  
18 the IEPR.

19 So, our net goal is 100 percent renewable  
20 energy. And in 2008 the Authority Board adopted a  
21 policy goal to run the operations with this 100 percent  
22 renewable energy.

23 Through subsequent planning, and active  
24 engagement and coordination with the sister agencies  
25 that we have, and the Energy Commission we have

1 determined that the most effective, feasible way to  
2 provide this 100 percent renewable energy for operations  
3 is to procure and produce enough renewable energy that  
4 can feed into the grid and offset the amount of energy  
5 that the system uses, which enables our net zero  
6 approach.

7           One thing we've been actively doing recently,  
8 with Meg's help, is we've engaged with the Air Resources  
9 Board and Energy Commission with this first phase with  
10 the contractor. We want to ensure and meet with them;  
11 that there are renewable fuels available to him for this  
12 first construction segment and that he can take  
13 advantage of that.

14           If we can make a business case for him to  
15 utilize that, we think we can do somewhat of a pilot  
16 project with him, including his latest tier engines that  
17 we're requiring.

18           The other thing is on the construction that  
19 percentage of biofuel renewable diesel, and then we also  
20 have -- we're going to be able to track the energy use  
21 within the project, including all of the other  
22 environmental commitments that we have.

23           For the project we have over 600 right now in  
24 our mitigation monitoring plan, and that doesn't include  
25 permits to come from resource agencies and other

1 permits, and requirements.

2           The Authority has developed a system we call  
3 EMMA, which is going to be able to track, in a share  
4 point database, all of those commitments, the  
5 contractor's compliance, and also we're going to provide  
6 folders for all the regulatory agencies to access their  
7 permits and those environmental commitments.

8           So, we're trying to be as transparent as  
9 possible in what we say we're going to do, and the end  
10 result, and to ensure that we can keep the project in  
11 compliance and keep building.

12           Thank you. Any questions?

13           COMMISSIONER SCOTT: Thank you. I do not have  
14 questions. Jim or -- thank you.

15           MR. MC LOUGHLIN: Thank you.

16           MR. OLSON: Thank you.

17           Okay, so we will go on to our next session which  
18 is the natural gas transportation. And to start off  
19 we're going to have kind of another overarching type of  
20 presentation given by Rosa Dominguez-Faus, UC Davis  
21 Institute of Transportation Studies and the Graduate  
22 School of Management.

23           She's a colleague of several people there,  
24 including Amy Jaffe and Sonya Yeh, who are doing a lot  
25 of work in this area.

1           And we've asked her to kind of discuss some of  
2   the impact of the pricing of natural gas and where the  
3   natural gas transportation options might occur.

4           MS. DOMINGUEZ-FAUS: Thank you, Tim, for the  
5   introduction. I'm substituting for Professor Amy Jaffe,  
6   who is the leader of the natural gas as a transportation  
7   fuel research.

8           And I'm going to try to summarize our results  
9   from several groups at the School of Management and the  
10   Institute of Transportation Studies at UC Davis, as Tim  
11   said.

12           Our questions are -- can you hear me well?

13           How sustainable is the shale revolution in the  
14   United States?

15           What is the potential for natural gas as a  
16   direct or indirect transportation fuel in California in  
17   the light of the shale revolution?

18           And what are our initial scenario analyses, as  
19   well as other sources show about the potential for  
20   natural gas to displace petroleum and reduce greenhouse  
21   gas emissions, and improve air quality in the U.S. and  
22   California.

23           So, about resources, we have lots of natural gas  
24   since the onset of the shale revolution about ten years  
25   ago. Hydraulic fracking in combination with horizontal

1 drilling have -- we can produce lots of -- vast amounts  
2 of natural gas with these techniques at very low cost.

3 Shale gas is widely distributed in the U.S.  
4 geographic region. Breaking in costs are around \$4 per  
5 medium btu of natural gas. It can be even lower.

6 In some sweet spots, in some of the dry shale  
7 places, breaking in costs are around \$2 per medium btu,  
8 and in some places is actually zero because it's gas, as  
9 I stated, with the production of oil.

10 So, we have, basically, gas that is subsidized  
11 with the production of oil that's -- well, we're seeing  
12 it more increasingly because oil prices are very high.

13 So, we see our projects are that these surpluses  
14 of cheap natural gas are here to stay for a while. What  
15 this graph is showing, the total resource of natural  
16 gas. We have in red is conventional natural gas. In  
17 green is associated natural gas from the production of  
18 oil. In purple we have shale gas.

19 And in blue we have backlog gas. And this is  
20 gas from dry gas wells that have been drilled, and could  
21 be producing, but are not being producing because,  
22 basically, the price of natural gas is too low. There's  
23 no market for this natural gas.

24 So, prices are to stay low for a while because,  
25 as you can see, the share of associated natural gas, the

1 resource of -- the part of natural gas that's going to  
2 be very cheap is increasing. And even if we, when we  
3 need to drill just dry gas wells, innovation might drive  
4 costs down.

5 So, we think prices of natural gas are going to  
6 stay down for a while.

7 And what's driving the penetration of natural  
8 gas in transportation is the differential of prices with  
9 oil. And we see that historically oil prices have been  
10 a little lower than natural gas, but that's changed  
11 recently and we have natural gas that's much cheaper  
12 than oil.

13 But will that remain? That's part of the  
14 modeling that we're conducting. There's many factors  
15 that affect these price dynamics. Wow, there's so many  
16 because I chose to show it in pictures because I thought  
17 that would be better than a thousand words in here.

18 So, on the left I have the factors that bring  
19 the price down. Lots of shale resources right now in  
20 the U.S., not enough demand, and we don't have a lot  
21 of -- we have a lot of storage capacity, but we used to  
22 have more resource. So, it's not that we can bring it  
23 to -- we don't have enough pipeline and storage capacity  
24 to take care of it, so we cannot bring it into the  
25 market. And a lot of it is being flared or vented,

1 about 30 percent is being flared or vented.

2 So, there's just lots of natural gas supply and  
3 not so much demand. That brings prices of natural gas  
4 down.

5 In the middle column we have the factors that  
6 could bring prices of natural gas up. Demand in the  
7 power sector. With the new Obama energy plan we'll see  
8 less coal in electricity production generation. We'll  
9 have more renewables and those will come with natural  
10 gas -- renewables are intermittent and they need to be  
11 backed up with another source of fuel, and we use  
12 natural gas in the U.S. And that's a good thing because  
13 that's driving CO2 emissions down.

14 In Germany, for example, they're backing up  
15 renewable power with coal and that's driving their CO2  
16 emissions from power generation up.

17 Another thing that will create demand for  
18 natural gas is, well, we've talked about before in this  
19 forum, is the manufacturing renaissance that is believed  
20 to happen in the U.S.

21 Also, planned capacity for ethylene cracking  
22 that comes from natural gas and, as you may know, it's  
23 feedstock for a lot of manufacturing products.

24 We might see more LNG exports. A couple of  
25 export facilities being planned in the Gulf, although

1   that's going to be a little more limited than most  
2   people think.

3           Just this week a *Washington Post* article showed  
4   how there's going to be a market for only maybe five  
5   export facilities.

6           There are other sources of demand of natural  
7   gas, like vehicles. And also, globally, we're seeing a  
8   decline in nuclear power and that might produce more --  
9   might create more demand of natural gas for the power  
10   sector.

11          And then we might have relations or concerns of  
12   safety and the environmental concerns for fracking that,  
13   you know, limit the amount of supply and, therefore, we  
14   might see prices going up for these reasons.

15          But we think there's a lot of resource and that  
16   there's a lot of innovation going on to take care of  
17   environmental concerns, green completions and everything  
18   to maintain -- to reduce methane leakages, to reduce or  
19   eliminate the use of water, and even to bring costs of  
20   producing natural gas down in the future.

21          So, price forecasts. We don't have our own  
22   forecasts, yet, so what I'm showing here, it's DOE  
23   forecasts. And you can see that on the left graph it's  
24   oil and on the right-hand side graph is natural gas. In  
25   the first period, at 2010-2020 of natural gas, we see



1 it's going to be around the \$4 per medium Btu, which is  
2 what we're seeing today, \$2 to \$4.

3 And then it's going to increase from \$4 to \$6,  
4 and then \$6 to \$8. Those are DOE forecasts.

5 We think that's pessimistic. We think it's  
6 going to stay lower than that.

7 And also for oil, but oil has a different  
8 context with lots of the resource coming from the Middle  
9 East which, as we know, it has its own set of problems.

10 But nevertheless it's one thing is the price of  
11 the commodity at the well and then the price of the fuel  
12 at the pump.

13 And a 50 percent increase of natural gas at the  
14 well is translated to a 10 percent increase of the  
15 natural gas fuel at the pump; whereas a 50 percent  
16 increase of oil commodity at the well translates into a  
17 30 percent increase of oil fuels, gasoline or diesel, at  
18 the pump.

19 So, in other words, LNG and CNG are more  
20 shielded against variations in natural gas price  
21 fluctuations that gasoline and diesel are from oil  
22 filtrations.

23 So, that was for the fuel side. Now, let's see  
24 what's happening in the vehicle side. Lots of resource,  
25 so producers are trying to find demand.

1           And we see the example is the State of Oklahoma,  
2   where it's having this initiative of creating demand for  
3   natural gas. Natural gas production is important in  
4   this state so they want to help it.

5           So, they're negotiating -- and one of the  
6   problems with natural gas vehicles is that they have  
7   higher upfront costs. The vehicles, themselves, are  
8   more expensive than their counterpart, the petroleum  
9   counterpart, right.

10          So, what they're doing is negotiating lower  
11   price with original equipment and manufacturers.

12          The other thing they're doing is taxing CNG at  
13   the pump and using those funds to subsidize filling  
14   stations, fueling stations, and home refueling stations  
15   in order to overcome the problem of the lack of fueling  
16   infrastructure.

17          This is an example that we got from the  
18   Secretary of Energy, at the State of Oklahoma. This is  
19   showing the cost of some of the vehicles before and  
20   after the deal, some savings up to \$6,000 per vehicle in  
21   some of the models.

22          Some of the models are bi-fuel vehicles, as  
23   indicated with the (B) or dedicated vehicles, just  
24   natural gas vehicles with a (D). And bi-fuel vehicles  
25   could be just with gasoline, too, so that provides them

1 the advantage of being more flexible if natural gas  
2 prices at any point go super high they can still use  
3 gasoline, and not lose all the investment.

4 But what we see in the bottom graph is a side-  
5 by-side comparison of a gasoline vehicle -- the same  
6 model with a gasoline and natural gas vehicle.

7 Initial vehicle costs are a little higher  
8 (indiscernible) -- fuel costs on a unique basis are much  
9 cheaper, much lower for natural gas, seeing a useful  
10 life. And the total lifecycle costs, that's  
11 significantly lower for a natural gas vehicle.

12 And that's for one specific model. And then  
13 that's the State of Oklahoma purchasing their government  
14 cars. So, overall they're thinking they'll be able to  
15 save \$6.9 million in the lifecycle of these vehicles.

16 Now, that's for government vehicles.

17 For trucks it's different, you don't look at  
18 lifecycle costs. You look at payback period. And  
19 that's because most trucking companies own the vehicle  
20 for a short period of time and then they resell them on  
21 a secondary market. So, they're interested in  
22 recovering their initial investment in a short period of  
23 time.

24 So, not all companies can afford to make the  
25 large investment of that LNG truck is, and that's a

1 larger investment than a CNG vehicle is. And so what we  
2 think that works is that it's -- it's trucks that have a  
3 limited range, even though they're like long-haul  
4 transportation, it's companies that operate regionally,  
5 because they have a limited range of 400 miles.

6           However, they have to have a high intensity of  
7 use, more than 100,000 miles a year. And then they have  
8 to have access to terminal fueling infrastructure  
9 because that's an important limiting factor nowadays.

10           This is an example of a modeling study that  
11 we've conducted at UC Davis, and that's for Class 8  
12 trucks. We're comparing different alternative fuels to  
13 a conventional diesel.

14           And we've looked at -- so, we're comparing -- is  
15 that better? -- conventional diesel to hybridizing it,  
16 which is actually the lowest initial cost. Those are  
17 the additional costs of the vehicles.

18           Then we have LNG, with a spark ignition engine,  
19 LNG with a conventional ignition engine, LNG spark  
20 ignition hybrid, LNG compression ignition hybrid, and  
21 then batteries and fuel trucks.

22           And what we are calculating is a payback period,  
23 and also break even costs. And what we're finding is  
24 that it won't work for any kind of company, like I was  
25 trying to explain before, it depends on the type of

1 engine, and the driving cycle, and the driving  
2 intensity. And given today's -- and those are standard  
3 DOE prices, so calculations might change in specific  
4 cases.

5 But given today's assumptions of diesel prices  
6 of \$4 a gallon, and LNG prices of \$2.923 on a diesel  
7 gallon equivalent basis, you only -- for long-haul  
8 drives, long-haul trucks that are heavily used will  
9 have -- will be -- it will make sense for a company to  
10 do that and will get a payback period of three years.

11 So, we think, and this is actually showing  
12 projections from different consulting and industry  
13 group, and we think the adoption rate is going to be  
14 slow in the next few years. Something like 5 to 10  
15 percent of new vehicle sales of the Class 8 truck  
16 vehicles will be natural gas vehicles.

17 But a faster adoption rate might occur in the  
18 next few years. Some think it could be as fast as 40 or  
19 50 percent of new vehicle sales.

20 So, this map is showing heavy traffic truck  
21 corridors. And we're interested in California, and  
22 California is a heavy traffic zone, so I think we would  
23 see that happening here.

24 So, now I'm moving to the last part of the talk,  
25 which is the effects on greenhouse gas emissions and

1 what are the key assumptions for our results.

2 This modeling study for Class 8 truck engines  
3 and that's measured -- that's compare different  
4 alternative fuel engine technologies for Class 8 trucks  
5 is measured CO2 emissions. It's measuring only tailpipe  
6 emissions.

7 And we find that natural gas trucks, natural gas  
8 engine for Class 8 trucks can drop CO2 emissions to an  
9 80 percent of a conventional diesel vehicle.

10 And, actually, the emissions -- the reduction in  
11 emissions might be more significant than just  
12 hybridizing a diesel truck, which is not as effective.

13 But now that was just tailpipe emissions by  
14 comparing different type of engine technologies for  
15 Class 8 trucks.

16 Now, this is another study. We're building  
17 scenarios for the entire heavy duty sector. And we have  
18 several assumptions of fuel usage, fuel substitution and  
19 technology adoption rates that I pull up here. I'm not  
20 going to explain them because this is like the thesis of  
21 one of our students. And I have the source at the end  
22 of my presentation, and the link where you can download,  
23 if anyone is interested in the details.

24 But what I want to show you is that this is  
25 projecting a progressive reduction of gasoline and

1 diesel used, and more CNG and LNG, and hybridization, so  
2 these will be a reduction in fuel.

3 And also, we assumed there's going to be more,  
4 increasingly the use of low carbon fuels, and that  
5 includes biogas.

6 And the results of these scenarios is -- and  
7 we're also measuring not only tailpipe emissions, but  
8 lifecycle emissions, and not only CO2 emissions, but  
9 every criterion pollutant and also other greenhouse gas  
10 emissions.

11 So, the result is that in this scenario,  
12 compared to the baseline scenario which is what we're  
13 doing today, we have significant reductions on CO2  
14 emissions, methane emissions, and Sox.

15 And we have significant increases in N2O and  
16 non-methane hydrocarbons.

17 Now, in terms of lifecycle segments that  
18 contribute to these emissions, we see that tailpipe  
19 emissions are half as much as in the baseline scenario.  
20 And if we have a higher penetration of natural gas  
21 vehicles, and in terms of upstream emissions we have  
22 much less CO2 emissions in this scenario because of  
23 these hybridization and these adoption of low carbon  
24 fuels.

25 Another part of this project is studying the

1 social costs of these -- of adopting this, and that  
2 includes costs of air pollution, climate change, noise,  
3 et cetera.

4 And what this is showing is the alternative fuel  
5 scenario, which is the scenario that I just described,  
6 it has a lower social cost, it's in green here, than the  
7 baseline, the reference scenario and another scenario,  
8 the high-efficiency scenario that we considered in this  
9 model.

10 So, I was told to try to keep it real and less  
11 academic, but there's a lot of research, issues that are  
12 a little bit in the realm of academia right now. But  
13 are little by little trickling into actual results and  
14 some of them are -- we're using more of a consequential  
15 LCA analyses than attributional and that's integrated in  
16 direct effects.

17 That's like what we've heard before about  
18 biofuels and the land use changes. Or for natural gas,  
19 it occurs to me, it's for fracking we're using more  
20 water and that's like an indirect effect, for example.

21 And we also are incorporating in our analyses of  
22 overall greenhouse gas emissions, their bound effect.  
23 And that's true for any alternative fuel. Creating more  
24 alternative fuels, even if they're like low carbon,  
25 might increase overall carbon emissions and that's



1 because you're making the conventional fuels available  
2 in other markets at a lower price, and that incentivizes  
3 the use of those high carbon fuels elsewhere, so  
4 globally you have a net increase.

5 Also, the time rise on your use to calculate the  
6 global warming potential effect, the weights when you  
7 convert equivalences in CO2 equivalent.

8 And other broader social economic aspects that  
9 we need to take into account, like the fact that there's  
10 lots of venting and flaring nowadays in gas production  
11 because the price is low.

12 If there was demand for this natural gas, maybe  
13 they would care to capture it and sell it.

14 And also, of course, regulation, we could always  
15 regulate that.

16 And there's new green completions that are  
17 probably coming in place soon, and we'll see that, that  
18 will change.

19 So with this I would like to finish. And those  
20 are some of the works that I've described. I have our  
21 server here. We have lots of these reports that are  
22 publicly available.

23 We also have Professor Amy Jaffe's faculty page.  
24 We have lots of her reports there.

25 And there's my contact information if you have

1 any questions.

2 COMMISSIONER SCOTT: I do have one question and  
3 I recognize that it probably, actually could warrant  
4 quite a bit of discussion, and so maybe just give me an  
5 overview point and then I could follow up later.

6 But on page, slide 7 you mentioned during the  
7 price forecasts that your estimation is that the prices  
8 will stay more steady. What were some of the reasons  
9 for that?

10 MS. DOMINGUEZ-FAUS: The reason is that we have  
11 really a lot of supply and that there will be -- we're  
12 trying to create this demand, but that's going to take  
13 time before we can create this demand. And at this time  
14 it buys us time for the current investment in innovation  
15 to produce better technologies that would lower the  
16 costs and, therefore, reveal even more resources at a  
17 lower price.

18 COMMISSIONER SCOTT: That's a good, succinct  
19 answer.

20 Jim or Hazel, questions?

21 MR. BARTRIDGE: No questions.

22 COMMISSIONER SCOTT: Okay, thank you.

23 MR. OLSON: Okay, moving on to our next speaker,  
24 we've invited Tim Carmichael with the California Natural  
25 Gas Vehicle Coalition to talk about some of the other

1 aspects of natural gas vehicles, and some discussion of  
2 where we think we're going in terms of projections.

3 MR. CARMICHAEL: Thank you very much, Tim,  
4 Commissioner Scott, and the rest of the CEC staff. It's  
5 a pleasure to be here, glad to be part of this workshop.

6 Let me start by saying that I drove here in my  
7 natural gas Civic. And if you could pass on to  
8 Commissioner McAllister, it's not about the guilt. It's  
9 about inspiring him, all right.

10 So, with that let me start by sharing a little  
11 bit about who I represent. This, you know, capture of  
12 logos I think is a good way to show you who's on my  
13 board of directors. It's a mix of companies that sell  
14 fuel for transportation purposes, companies that build  
15 vehicles, and companies that use natural gas in their  
16 fleets.

17 We've heard this -- I think everyone in the room  
18 has heard some version of this recently. It's just a  
19 short list of all the wonderful things about natural  
20 gas, which you can study later.

21 It wouldn't be right for me to be up here and  
22 not do a brief advertisement for some of my members,  
23 especially since things have changed in a positive way  
24 with the availability of natural gas vehicles.

25 These are some of the light duty natural gas

1 vehicles that you can get today. The pickup trucks,  
2 which I think a couple people have mentioned today, are  
3 dual-fuel and the Civic is dedicated natural gas.

4           There's also, I represent some companies that  
5 are converters or up-fitters, and they get new vehicles  
6 from GM, Ford, for example, and these are some of the  
7 examples of the medium duty vehicles.

8           I think Philip Sheehy mentioned this, this  
9 morning, this is a sector -- it's a little bit difficult  
10 to predict what's going to happen in this sector because  
11 there's a lot of options available to them, and they all  
12 have different duty cycles depending on your fleet.

13           But for example, AT&T and Verizon are buying  
14 thousands of natural gas service vans because here in  
15 California not only do they get the lower fuel price,  
16 they get HOV line access. And that helps them on their  
17 service time.

18           So, you shouldn't have to wait as long for that  
19 AT&T installation next time. That was a joke.

20           So, let me just see, yeah a couple of things I  
21 want to mention that -- let me go back one slide.

22           One of the things that we have been working on  
23 with these companies is ARB's conversion certification  
24 program. That's the process you have to go through if  
25 you want to get approval to sell a conversion kit for

1 your fuel in California, whether it's a new vehicle up-  
2 fit, or an end use or used vehicle.

3 And over the last year and a half we've made a  
4 lot of progress in discussions with ARB and I'm pretty  
5 confident that this fall they're going to update their  
6 regulations in a very positive way that will make it  
7 easier for companies; easier as in shorter time period  
8 and lower cost.

9 So you'll see, I hope, not only more product  
10 availability, but lower cost for these up-fits.

11 Moving on to heavy duty, a wide variety -- and  
12 Tim also knows this pretty well because of the tardiness  
13 to my presentation. But a lot of people were sending me  
14 information for input to share with you today.

15 There has been -- as Rosa showed in one of her  
16 slides, there's been a lot of work done over the last  
17 year, 18 months, looking at natural gas, and everyone's  
18 got their theories on what's going to happen over the  
19 next 5 to 20 years.

20 So, we also did some of this work as an  
21 organization. The numbers -- that first estimate I  
22 compiled from data from gas utilities around the State  
23 and my members.

24 I'm intentionally not giving you a breakdown by  
25 company because they don't want you to know that. But

1    this is a good estimate, we think, of what happened in  
2    2012, at least it's our best estimate at this time.

3           The next set of numbers is projections that we  
4    developed earlier this year, late last year with our  
5    membership. You know, feeding off of the National  
6    Petroleum Council's work last summer, which was looking  
7    at national projections, we used California population  
8    as a surrogate to estimate, you know, the percentage of  
9    those national projections that were likely on the State  
10   level.

11           We looked at work that the CEC has done, going  
12   back to 2007 looking at natural gas projections, and we  
13   came up with these three scenarios.

14           This is what feed into -- at least one of the  
15   data sources that fed into the work that ICF did on low  
16   carbon fuels that Philip Sheehy started the day with in  
17   presenting to this group.

18           Let me say that there is a lot of debate among  
19   my membership as to what is -- which one of these  
20   numbers is right and, even more importantly, what's the  
21   likely split between CNG and LNG, compressed natural gas  
22   versus liquefied natural gas.

23           Today, in California, it's about 90 percent CNG,  
24   10 percent LNG.

25           I have members that are very confident that it's

1 going to be about a 50/50 split in 2020 and I've got  
2 members that believe it's going to be the reverse of  
3 what it is today, and 90 percent LNG, 10 percent CNG in  
4 2020.

5           There are good arguments, you know, supporting  
6 those different perspectives. And I'm happy to talk to  
7 people that want to get into more details after today.

8           A couple of highlights of the research that we  
9 pulled from for today, the National Petroleum Council is  
10 talking about 40 percent, or just under 40 percent heavy  
11 duty trucks by 2020 could be natural gas and as much as  
12 50 percent of the market by 2040.

13           ACT Research, about a third of the fleet in  
14 2020, and these are national projections.

15           And in CD Energy's report about 25 percent.

16           In addition to these, I have reports from my  
17 members, talking to truck and engine OEMs, who are  
18 talking about a little bit more conservative numbers of  
19 20 percent of the market in 2020. Twenty percent of the  
20 heavy duty market in 2020 being natural gas.

21           And, typically, at least their estimates these  
22 days are 50/50 split between CNG and LNG.

23           A couple other numbers I want to keep your head  
24 spinning with is the number of natural gas vehicles in  
25 the country, somewhere between 120 and 150 thousand, the

1 number in California, we think between 25 and 30  
2 thousand.

3 The numbers globally are now up to -- well, it  
4 depends on whose numbers you believe, but in the range  
5 of 14 or 15 million vehicles, and there are now  
6 projections that we could have as many as 35 million  
7 natural gas vehicles globally by 2020.

8 As the staff has heard me say before, this is an  
9 unusual situation with natural gas compared to other  
10 alternative fuels in that California is not on the  
11 leading edge of deployment of this fuel compared to the  
12 rest of the world.

13 We can argue for all the other fuels and  
14 technologies we probably are. In natural gas, I submit  
15 we're lagging a bit.

16 Also, these percentages are more helpful if you  
17 know roughly where the market is for trucks on an annual  
18 basis. And I think a good number right now is about  
19 225,000 Class 7 and Class 8 trucks.

20 And I'm going to show a slide on this in a  
21 minute that will give you a bit more detail. Yeah, I  
22 think that's good for now.

23 So, let's see, I included this slide just  
24 because it's interesting to note that there are -- hang  
25 on a second, I might have skipped a slide, let me just



1 see. No. Well, maybe I shuffled a slide.

2 This is a forecast just showing, you know,  
3 significant growth and that's the one thing that's  
4 consistent between all of these projections that I'm  
5 sharing, whether it's the OEM's more conservative, or  
6 these various groups that were brought together to do an  
7 analysis, they're all showing significant growth. As  
8 much as -- you know, and there's quite a bit of  
9 consistency in the five-year projections of 50 percent  
10 growth over time -- growth rate over time.

11 This is from ACT Research just showing what they  
12 think's going to happen with Class 8, which is the  
13 heaviest duty, on-highway natural gas trucks.

14 At the bottom there you can see the sales per  
15 year and then the cumulative sales.

16 Another number slide for you, a couple of things  
17 I'd like to point out on this one. So, there's  
18 significant ramp up -- I'm not sure which slides you  
19 guys are looking at, or projectors.

20 But here -- oh, total sales, trucks and bus  
21 going up significantly. They get to 35 percent in 2020.

22 But I also want to point out that there's much  
23 higher penetration already in the refuse. We're at 50  
24 percent of the market. And in transit we're at 50  
25 percent.

1           Transit's going to go up to about two-thirds is  
2 what people are predicting, but refuse is on a  
3 trajectory to be 95 percent in the next few years.

4           It's a smaller market, but they're finding great  
5 success running on natural gas.

6           I also want to point out, for those in State  
7 government, the municipal fleet numbers are at a faster  
8 growth rate. And I think there's two reasons for this,  
9 one is there's a lot of pressure on local and State  
10 governments to save money in their operations, so the  
11 fuel cost is a big deal.

12           But there's also the benefit that most of those  
13 State and local fleets are essentially fueled and they  
14 are coming back to the same base every night, in most  
15 cases.

16           Infrastructure, I just want to -- you know, Tim  
17 asked me to cover this as well, a little bit. I broke  
18 it down into big, medium and home. And big, if you --  
19 definitely if you're looking at the trade journals, but  
20 even if you're looking at *The New York Times*, *The*  
21 *Washington Post*, or *The L.A. Times*, you're seeing news  
22 announcements every few weeks about some big deal with a  
23 natural gas provider and some operator, whether they're  
24 operating truck stops, or they're operating a fleet.

25           All of these companies on the top list there, in

1 the big, not only are they partnership with stations,  
2 you know, whether it's LNG for freeway corridors, or  
3 within metropolitan areas to service a regional fleet,  
4 they're partnership with some of the biggest companies,  
5 whether it's UPS, or Frito-Lay, PepsiCo, or some of the  
6 others, and building stations where those fleets want  
7 the stations across the country.

8 That's a significant shift from where we were  
9 just a few years ago.

10 The other thing that's not on this slide, there  
11 are more than 40 companies across the country right now  
12 building natural gas stations.

13 Some of my -- some of the vehicle OEMs and some  
14 of my members are concerned about are we going to have  
15 enough infrastructure.

16 Today you're looking at a lot of activity, a lot  
17 of availability of funding to build natural gas  
18 refueling infrastructure.

19 I believe that's going to continue for the  
20 foreseeable future.

21 In the medium duty, I just want to mention that  
22 whether it's the AM/PM, or Circle K that you might buy  
23 your gas at, there are a number of companies that are  
24 targeting that market, where they're going in with a  
25 system that some people refer to as CNG in a box. Where

1 it's a unit they bring in, they put it on your site, and  
2 they can offer natural gas refueling at that location.

3 Other companies are, you know, installing single  
4 pumps or two pumps at these gasoline and diesel  
5 stations.

6 In some cases, I've got a company I'm talking to  
7 that's putting in refueling, natural gas refueling pumps  
8 at shopping malls, targeting that, you know, location.

9 And then, you know, on the smaller, for the  
10 passenger vehicle for you and me, there's significant  
11 potential here.

12 There isn't a lot of that product availability  
13 in the market today, but DOE put out a solicitation more  
14 than a year ago now. At least half a dozen companies  
15 got a chunk of that and they're tasked with, you know,  
16 developing the next generation of home refueling; high  
17 durability, low cost.

18 And that could be a game changer in the light  
19 duty market going forward.

20 Tim and staff asked us for key factors for NGV  
21 penetration over the next seven years. The fuel price  
22 spread, which a few people have talked about, is the  
23 most significant. It's definitely giving natural gas a  
24 competitive advantage today.

25 But there's also, you know, the question about

1 truck and engine availability.

2 In the heavy duty -- I'll cover this in a  
3 minute, in more depth. But in the heavy duty market  
4 you've got a lot more availability than you had six  
5 years ago, but you don't have as much as some fleets  
6 would like.

7 The question I mentioned about availability of  
8 infrastructure, improving, expanding, you know, rapidly,  
9 but not as widespread as petroleum for sure.

10 Engine costs, we're all going lower with  
11 emissions targets in the next generation engines. The  
12 question is what's the cost on those engines going to be  
13 and how competitive are they going to be with diesel or  
14 other fuels.

15 And then availability of incentives is a big  
16 piece. You know, \$12 million may not seem like a lot of  
17 money to the Energy Commission anymore, but in the  
18 natural gas world it's one of the biggest pots available  
19 in the country for natural gas incentives.

20 And, you know, every time I saw that people are  
21 surprised by that. But that's where we are as far as  
22 incentives for natural gas transportation.

23 The CEC AB 118 money is one of the biggest pots  
24 in the country so we cherish it.

25 I thought it would be helpful, I'm sure there's

1 some skeptics in the room, talking about how much  
2 progress can we make over the next seven years with  
3 natural gas transportation, and the adoption rates, how  
4 many vehicles can we actually get on the road, how many  
5 stations can we get built?

6 And I thought it would be interesting to take  
7 just a quick look at where we were in 2007 and where we  
8 are in 2013. And there's too much to put on one slide.

9 But quickly, in 2007, one 9-liter natural gas  
10 engine available in the Class 7 market. It was being  
11 used by the refuse and transit market. Less than 10  
12 percent of the refuse market was natural gas.

13 One small-volume manufacturer, BAF, converting,  
14 you know, taxis, and vans, and shuttle busses to natural  
15 gas. There may have been two and I apologize if I've  
16 got that wrong, but I think there was just one.

17 Only one light duty natural gas vehicle  
18 available in California, only one small LNG facility in  
19 the Western U.S.

20 In 2013, and I recognize the print's a bit  
21 smaller, but there's a lot more.

22 You know, all of the Class 8 truck manufacturers  
23 are offering natural gas trucks today, every transit bus  
24 manufacturer and refuse manufacturer.

25 More than 50 percent of the refuse market is --

1 or I should say at least 50 percent of the refuse market  
2 is natural gas.

3 We've got at least five small volume  
4 manufacturers doing conversions. We've got other major  
5 OEMs in the mix with the light duty market.

6 And we've got a few other things going on that  
7 are interesting. All the buzz seems to be about heavy  
8 duty trucks, but there's a lot going on in the bigger  
9 than heavy duty truck markets as well.

10 You've got Caterpillar and General Electric, you  
11 know, moving aggressively to develop natural gas  
12 locomotives.

13 You've got a lot going on in the marine world,  
14 and the mining. And some of you may have seen, British  
15 Columbia is starting to run their -- it has a plan to  
16 run their ferries on natural gas, other ports around the  
17 world, Hong Kong doing the same, Scandinavian countries  
18 looking at that or doing that.

19 And then we've got a couple more LNG production  
20 facilities in the west.

21 So, six years, a lot of change.

22 Here's a California gloat or California  
23 opportunity, depending on your perspective. We are  
24 well-positioned to lead on a national level. We have  
25 the most infrastructure, proportionally.

1           I heard a number today that the stations in the  
2 State may be as many as 600. But for sure it's more  
3 than 400, and that's about a third of the nation.

4           LNG supplies in-state and nearby, good success  
5 stories in various fleet types in the State.

6           And we have, you know, I'll call it a benefit,  
7 though my friends in WSPA won't agree with this, the  
8 higher petroleum prices in the State mean natural gas  
9 looks even better as a competitive fuel.

10           That said, it would be fair to say that the  
11 Energy Commission is our best State level ally.

12           The South Coast AQMD is probably our best  
13 regional ally.

14           But beyond your two agencies, there has not been  
15 a lot of support for natural gas transportation in the  
16 State. I emphasize this because there's a lot of  
17 opportunity, I think, for the Administration and for the  
18 State as a whole to do more to embrace this fuel.

19           I commented to a friend earlier on, when Rosa  
20 was highlighting the Oklahoma experience, you know,  
21 Oklahoma was part of this group of 22 states that put a  
22 buying consortium together.

23           Governor Brown's office was approached on that  
24 and took a pass. And I think that's a real pity given  
25 how much pressure there is on our Department of General



1 Services to do more with the State fleet. And electric  
2 can't meet all the application needs, so there's more we  
3 can do as a State.

4 Contact information, yeah, a couple of people  
5 included the web links to the different resources they  
6 used. I neglected to do that. I'm happy to provide  
7 those to anybody who contacts me, and I can give that to  
8 the staff here, as well.

9 Thanks very much for the opportunity, again.

10 MR. OLSON: Thank you, Tim.

11 So, our last speaker of this session will cover  
12 kind of an interesting aspect of natural gas and that's  
13 renewable natural gas.

14 And I'd like to welcome Johannes Escudero, who's  
15 the Executive Director of a fairly new association, the  
16 Coalition for Renewable Natural Gas.

17 MR. ESCUDERO: Well, good afternoon, ladies and  
18 gentlemen. And I just want to thank and acknowledge  
19 Commissioner Scott. And it's good to meet Hazel, and  
20 Jim good to see you again.

21 Tim, thank you for the invitation to -- of our  
22 industry that we represent, the Coalition for Renewable  
23 Natural Gas.

24 And briefly, as Tim alluded to, we are a fairly  
25 new trade association, a 501(c)(6), who represents a

1 number of developers, engineers, financiers, gas  
2 marketers, gas transporters, as well as related law  
3 firms and organized labor, and a couple of utilities as  
4 well internationally.

5           We're proud to wear that distinction. We just  
6 now, in the last two weeks, welcomed our first  
7 international member from Brazil, so we were  
8 particularly interested in the topics earlier this  
9 afternoon.

10           But the Coalition was formed in 2011 and our  
11 mission focus is the increased utilization and  
12 advancement of renewable natural gas.

13           We're a membership-based organization, very  
14 strong focus on public policy, and our success is driven  
15 by the relationships that we have and continue to  
16 foster.

17           A brief overview of our presentation today, do  
18 not fear, I recognize I'm standing between most of you  
19 and dinner, perhaps, so we'll breeze through the 30  
20 slides, of which there are only 27 remaining, in a short  
21 amount of time.

22           I think a couple of definitions will be helpful  
23 in terms of understanding renewable natural gas and the  
24 different technologies used that are sometimes  
25 interchangeable, sometimes not, particularly in light of

1 today's application for transportation fuel.

2           We'll consider the potential, per Tim's request,  
3 give thought to the drivers behind growth and increased  
4 use of RNG in California as a transportation fuel. And  
5 then provide you kind of two perspectives, one being  
6 kind of the idealistic and a second, perhaps a more  
7 realistic estimate of available volume of renewable  
8 natural gas for a transportation fuel between now and  
9 2020.

10           And then we'll conclude in a few moments with  
11 sharing a few industry insights, challenges that we face  
12 and as well as providing some recommended actions for  
13 government consideration today.

14           Biogas is a mixture of hydrocarbons that is a  
15 gas at 60 degrees Fahrenheit, at one atmospheric  
16 pressure that is produced through the conversion or  
17 decomposition of organic matter.

18           It includes landfill gas from waste digesters,  
19 landfills, gas from wastewater treatment facilities.

20           Waste digesters include digesters that process  
21 animal waste, biogenic gas or fats, oils and greases  
22 separate from food and yard waste, and also include crop  
23 residues.

24           Waste treatment plants include wastewater  
25 treatment facilities and publicly owned treatment works,

1    although, our focus today will be more so on the  
2    primarily source of renewable natural gas in California  
3    that will come from landfills.

4           Renewable compressed natural gas is biogas  
5    that's processed to the same standards that pipeline  
6    natural gas, or biomethane. So to distinguish between  
7    biogas and biomethane, biogas generally speaking is the  
8    raw methane that's initially captured at a landfill or  
9    wastewater treatment facility. When it is treated to  
10   meet certain pipeline specifications, the industry  
11   refers to that same product, biogas, as biomethane.

12           And when it conforms to the pipeline standards  
13   it becomes renewable compressed natural gas. And  
14   there's the metrics here that I won't bore you to death  
15   with here.

16           But it's important to note that only renewable  
17   CNG that qualifies as a renewable fuel and is used for  
18   transportation fuel purposes can generate a RINs under  
19   the current Federal Renewable Fuel Standard Program.

20           Similarly, there's renewable liquefied natural  
21   gas. It's biogas that can be blended in with natural  
22   gas to create like RCNG, also RLNG.

23           And the same caveat applies for RIN  
24   qualification under the RFS.

25           Now, just a brief schematic here from the

1 landfill source, the cleanup and conversion,  
2 compression, liquefaction process that biogas from the  
3 source undergoes in order to produce the pipeline  
4 quality product, biomethane, whether it's used -- most  
5 commonly in California, at present, for combustion and  
6 the generation of power but, hopefully, on a larger  
7 scale moving forward for alternative transportation fuel  
8 purposes, as well.

9           Biomethane versus natural gas, so one of the  
10 first questions we often receive when discussing what is  
11 renewable natural gas is what's the difference between  
12 RNG and fossil fuel natural gas?

13           The composition is very similar, they share a  
14 lot of different -- the trace components, constituents,  
15 and the major difference is in the source of the  
16 product.

17           And so kind of the funny one-liner we've used  
18 before is it's the difference between what's decaying,  
19 is it last night's or last week's tuna sandwich or is it  
20 T-Rex?

21           One being a fossil fuel source of origination,  
22 the other being a renewable source.

23           And in California, by virtue of our population,  
24 we have the largest landfills in the nation, we produce  
25 the most amount of trash, and so we're hopeful that we

1 can continue to utilize as much of that, capture it,  
2 clean it up, put it to good use to the total benefit of  
3 both the environment and the economy rather than just  
4 flaring and literally wasting the resource that we have  
5 here at our disposal in the Golden State.

6 Potential end uses of renewable natural gas  
7 across, well, internationally primarily have been to  
8 present for, as I mentioned earlier, electricity  
9 generation.

10 States, like California, recognize the benefit  
11 environmentally and afford different levels of content  
12 categories where renewable natural gas, if it's used to  
13 generate electric power can qualify for RPS credits.

14 But RNG's also used for thermal heating. And  
15 some states, actually allow RNG to double dip, be used  
16 for electric power and get RPS credits and, also, if  
17 it's used for heating application to local residents can  
18 generate AECs, or alternative energy credits under their  
19 alternative portfolio standards.

20 But today we're focused, thus the highlight is  
21 the use of RNG for transportation fuels. And in  
22 parentheses there you'll note the two primary drivers  
23 we'll talk more about later, being the RFS-2, now, and  
24 California's LCFS.

25 Just a quick picture here to kind of summarize,

1 I know the numbers may contradict slightly. Certainly,  
2 I would defer to Tim Carmichael, who would know better  
3 than we in terms of how many natural gas vehicles there  
4 are nationwide, worldwide, and in California.

5 But the estimates there, as he alluded to, are  
6 nearly 16 million worldwide, 250,000 nationwide. And  
7 certainly look forward to working closely together to  
8 see that number continue to grow.

9 Potential, the potential growth for renewable  
10 natural gas in California, in terms of use for  
11 transportation fuel, there's a couple of drivers. There  
12 are a couple of drivers that really drive growth and  
13 we've kind of labeled them as backseat drivers and  
14 designated drivers.

15 So, I'll give you first the backseat driver,  
16 which is the technical data that certainly comes into  
17 play and factors in the direction that the industry is  
18 going. And it really comes down to two components, and  
19 those are the technical engineering and the financial  
20 engineering.

21 For example, one of the largest landfills owned  
22 and developed by one of our members, currently,  
23 previously had three cases of bankruptcy. And in all  
24 three cases, including the current owner and developer,  
25 using the exact same technology, just employing

1 different financial engineering, and so these elements  
2 are crucial to the success and growth of RNG projects,  
3 particularly in California.

4 And then the designated driver, which we'll  
5 conclude with, is public policy, and I think what we're  
6 most interested in today.

7 But the technical data that does drive and  
8 influence the potential of RNG generally -- we'll try to  
9 give you this in a nutshell, but generally speaking the  
10 MMBtu or -- this is -- Btu is a British thermal unit of  
11 measurement. This refers here to 1 billion -- MMBtu is  
12 1 billion British thermal units.

13 So, the MMBtu of gas produced per day, from a  
14 landfill for example, factors into how and for what end  
15 use purpose an eligible landfill project may be  
16 developed.

17 Smaller landfills, typically, are developed for  
18 on-site electric power purposes, for thermal heat  
19 application, or to fuel their fleets on the site, like  
20 the refuse waste management or public services companies  
21 that Tim mentioned earlier.

22 Raw biogas, depending on the source, is  
23 approximately 50 to 55 percent methane content. An on-  
24 site fueling station needs to hit a 90 percent target.

25 And so there's a process there, the diagram we



1 showed earlier, the cleanup, adding, blending different  
2 fuels, different requirements depending on the state and  
3 regulations.

4 Larger landfills are usually developed to  
5 deliver pipeline quality biomethane for off-site  
6 generation of electric power for thermal heat, or  
7 utilization as a transportation fuel.

8 And I might just, as a side note, mention that  
9 in California our municipal utilities have been a  
10 tremendous ally and customer to developers of renewable  
11 natural gas across the nation. They obviously  
12 identified the benefits of biomethane and have targeted  
13 as one of their top priorities for procurement for the  
14 next 20 years. Because they can procure it for a long  
15 term, it's under the benefits of the RPS.

16 At least that was before AB 2196, last year.

17 But to deliver for off-site transportation fuel,  
18 in large quantities, renewable natural gas must meet  
19 pipeline specifications.

20 We mentioned earlier, in some cases there's the  
21 heating value requirements, depending on the utility.  
22 And every pipeline specification has a cost associated  
23 with that, and a rigorous process, and frequent  
24 monitoring and testing that accompanies it; which gives  
25 us a volumetric ratio that we'll again refer to,

1     shortly, when we present our ideal and realistic  
2     estimates for future available volume of the gas.

3             The second component or aspect of the technical  
4     data that serves as a backseat driver to industry growth  
5     is the financial engineering piece.

6             And kind of taking away the secret here from the  
7     secret by putting on the slide, but it's really not  
8     complicated.

9             The secret formula that was, for instance, the  
10    Dallas project I referred to earlier, the difference  
11    between three bankruptcies and a successful project  
12    producing very profitable revenues is that revenue must  
13    exceed expenses. I'm not an economist by any means, and  
14    don't pretend to be.

15            Value is created in terms of the dollar by  
16    governmental organizations, by financial institutions  
17    and is largely determined by public trust, or public  
18    faith you could say.

19            In fact, the word "finance" the first syllable,  
20    "fi", the root word is faith there. Semper fi is where  
21    finance comes from.

22            So, public trust or faith really does have an  
23    important role in the financial engineering of these  
24    projects, and you'll see how this ties into public  
25    policy.

1           So, due to the investment, which is literally  
2   tens of millions of dollars required, and limitation on  
3   access to markets, which we'll talk about shortly, on 39  
4   out of 594 operational landfills in the entire United  
5   States have been developed into high B2 projects.

6           I might note there are zero in California. The  
7   exception there is Waste Management's Altamont landfill,  
8   which they're currently using a combined cycle to  
9   generate electric power on-site, and also fuel their  
10   fleet. That would be the exception.

11           And then there's a wastewater treatment  
12   facility, the Point Loma project, which our developers  
13   scratch their heads and just wonder how they're making  
14   it, and we top our hats to them.

15           The reality is, the reason why they're able to  
16   make it is because they were the recipients of \$30  
17   million in grants. So, out of \$45 million necessary to  
18   develop, \$30 million of that has been in grants.

19           Well, we don't have that luxury on the renewable  
20   natural gas development. There are currently, and we'll  
21   talk about this again shortly, no Federal subsidies,  
22   grants available for development.

23           This is not true. There are a lot of costs.  
24   And for some reason it's -- oh, there it is. Okay, it  
25   just required another click.

1           So, I won't go through each line item, but if  
2   you look at the red tally on the bottom, basically this  
3   is a dollar figure of what it costs per MMBtu to develop  
4   a renewable natural gas project from a landfill.

5           And if you figure an average of 4,000 MMBtus  
6   produced per day, and you can do the calculation later,  
7   it's literally tens of millions of dollars.

8           Keep in mind the secret formula, revenues must  
9   exceed expenses predictably.

10          Well, as of May 2013 the Henry Hub pricing for  
11   natural gas is just \$4.23. So, the problem here is very  
12   evidence that the costs, compared to the cost to develop  
13   a high Btu RNG project, \$5.48 per MMBtu, the commodity  
14   price for the energy content in RNG does not meet the  
15   secret formula, you're losing a dollar and a quarter per  
16   MMBtu.

17          Predictable return on investment, the same is  
18   true for financiers who invest in RNG projects, as are  
19   investors across the board for other projects, they like  
20   to know they're getting their money back and like to  
21   have a sense of confidence that they can expect some  
22   return on their initial investment.

23          Likewise, owners and developers of these  
24   projects also want to make a profit.

25          And taxpayers like to know that their money is

1 not being flushed down the drain or, in this case,  
2 thrown away with the trash.

3 Let's get to the good news. The good news is  
4 now we're talking about public policy as a designated  
5 driver. The good news is that we know policy drives  
6 demand. For our industry demand drives value. And with  
7 good public policy in place the financing we've already  
8 gone through can and does work, even with the low  
9 current commodity pricing.

10 The RFS2 creates the RIN market and when you  
11 produce renewable fuel, and dedicate that fuel for  
12 transportation purposes, you generate a commodity that  
13 can be traded or sold on the market as a RIN. There's  
14 11.2 RINs per MMBtu, with a value of anywhere from 30  
15 cents to \$1.29 per RIN. This is as of July 16th.

16 And then on top of that, in California we have  
17 the LCFS credits, which are valued at approximately  
18 \$5.00 per MMBtu.

19 So, when you factor in all of these extra  
20 economic incentives made possible by the RFS, by the  
21 LCFS, these projects now are financeable and are doable.

22 And I will say that the growth of available RNG  
23 volume for transportation fuel by 2020 is very much  
24 dependent upon the continuation of and certainty  
25 provided by a good public policy program, like the

1 Federal RFS2 and California's own LCFS.

2 Now, we'll give you a couple of estimates.

3 First, the idealistic estimate of available volume by  
4 2020. Again, referring to our volumetric ratio, for  
5 every 1,000 MMBtu, for every 1 million Btus of  
6 biomethane produced per day you receive an approximately  
7 \$7,752 gasoline or diesel gallon equivalents.

8 So, based on a diesel truck driving an average  
9 of 150 miles per day, at 6 miles per gallon, consuming  
10 25 gallons per day, a thousand MMBtu can supply enough  
11 fuel each day for 310 trucks.

12 I might note there are approximately 1 million  
13 diesel vehicles operated on California's roadways each  
14 year.

15 And if all 80 operating and candidate landfills  
16 in California, identified by the Federal EPA's Landfill  
17 Methane Outreach Program, were developed to capture and  
18 process methane exclusively for transportation fuel  
19 purposes within 18 months or so these 80 landfills could  
20 produce approximately 31,008,000 diesel gallon  
21 equivalents of renewable natural gas.

22 That's enough RNG volume estimates to fuel at  
23 least 99,200 trucks per day between now and 2020.

24 For perspective, that's only about 10 percent of  
25 the diesel vehicles operating in California today.

1           So, that's the ideal, now let's bring it home to  
2   probably closer to where we are.

3           Our realistic RNG volume estimate, when you  
4   consider that there are only 39 high Btu landfill gas-  
5   to-energy projects that have been developed in the  
6   United States in the last 30 years, and there's only  
7   four in all of Canada, our members came together in a  
8   process of a working group and have estimated that,  
9   really, it's closer and likely that only 20 of  
10   California's candidate or operating landfill will be  
11   developed for an RNG project used exclusively for  
12   transportation fuel purposes.

13          Let me give you a little background on what  
14   constitutes a candidate or operating landfill. An  
15   operating landfill is exactly that, it's a landfill  
16   that's currently in operation, receiving waste in  
17   California, with at least 1 million tons of waste in  
18   place.

19          Our members, developers with industry  
20   experience, believe that it's necessary for landfills to  
21   have at least 2 million tons of waste in place in order  
22   to justify the financing and the output necessary for a  
23   high Btu project.

24          Nonetheless, factoring that in, in the next 18  
25   months or so, assuming that facility construction is

1 necessary, these 20 landfills could still produce,  
2 realistically, approximately 465,120 diesel gallon  
3 equivalents of renewable natural gas. There's a typo  
4 there and the comma is misplaced.

5           Again, that's enough RNG to fuel approximately  
6 18,600 trucks per day between now and 2020.

7           Not a large amount. It's low-hanging fruit,  
8 though. It's avoiding flaring this product and putting  
9 it to good use.

10           18,000 trucks would fuel Waste Management's  
11 entire fleet, for example, and still have some left  
12 over.

13           Of course, this realistic estimate assumes we're  
14 talking about a hundred percent RNG fuel blend, when the  
15 reality is that RNG can be blended with fossil fuel  
16 natural gas to improve the environmental attributes of  
17 natural gas and further the realistic estimate of the  
18 in-state supply of RNG available for the next number of  
19 years.

20           We're getting close to the end. A couple of  
21 industry insights, perspective from the renewable  
22 natural gas folks, here are the basic list of key  
23 factors that substantiate growth of the industry in  
24 California.

25           How am I doing on time? Are we doing okay?



1           Good public policy, as we mentioned earlier  
2 public policy, good policy drives demand, that demand  
3 drives value, value drives investment, and investment is  
4 what enables development.

5           Here are the challenges, so I broke those down  
6 in, quickly, three categories that we face in  
7 California. There are legislative and regulatory  
8 hurdles.

9           Unintended consequences, I had the privilege of  
10 speaking with former Senator Tom Hayden, who authorized  
11 the infamous bill in 1988, and it was his exact words  
12 that his bill, the intent of his bill was not to create  
13 an overarching umbrella to over-regulate and, basically,  
14 disable the injection of renewable natural gas from  
15 landfills and the natural gas pipelines.

16           Nonetheless it is what it is. As a result of  
17 the Hayden amendment, we have Southern California Gas  
18 Company's Rule 30 and PG&E's Rule 21 that effectively  
19 prohibit, make it cost-prohibitive to inject landfill  
20 gas into the natural gas pipelines.

21           We're working through that at present at the  
22 Public Utilities Commission and their current rulemaking  
23 proceeds, compliments to a bill that we support,  
24 Assembly Member Agado, AB 1900, that Governor Brown  
25 signed in September of last year. Regulations to ensure

1 that renewable natural gas receive treatment and open,  
2 nondiscriminatory access to the pipeline will be in  
3 place no later than December 31st of this year, by  
4 statute, so very happy about that.

5           Nonetheless, there have been unintended  
6 consequences that have been impediments to growth in  
7 California. And the irony is a lot of the RNG  
8 developers nationwide are based in California, but  
9 they've been forced to take their technology and their  
10 financing and take it out of state.

11           For example, the McCommas Bluff Landfill,  
12 referenced earlier, one of the largest in Texas, that  
13 gas is piped to the Sacramento Municipal Utility  
14 District and combusted for electric power.

15           And here we are sitting in California on a vast  
16 resource of our own trash. So, we look forward to  
17 keeping work together on those issues.

18           Also, policy incongruence, and briefly I'll just  
19 add that you've got clean air goals in California that  
20 contradict the renewable energy goals of the RPS.

21           For example, Waste Management, Republic  
22 Services, other refuse companies that are using on-site,  
23 combined cycle engines to generate electric power on-  
24 site at their landfills in California, currently, are  
25 now considering ceasing all operations and returning to

1 flaring that gas because of increased air district  
2 requirements.

3           So, there's a conflict there, there's an  
4 incongruence of policy. We've got to work together to  
5 make sure that our policy goals align.

6           And then there's policy uncertainty and  
7 unpredictability. Predictability is what investors need  
8 in order to provide financing to develop projects that  
9 will ensure predictable growth.

10           As much as we love the RFS, we just commented a  
11 week and a half ago, Congress solicited feedback from  
12 stakeholders as to proposed changes to the RFS. So,  
13 we've commented and we're engaged there. We want the  
14 RFS to continue. We want the RFS to be more permanent,  
15 we want it to have teeth.

16           And the same is true for the LCFS. Obviously,  
17 the recent court contest raised a lot of questions on  
18 people's mind and this uncertainty really affects the  
19 industry and impedes development.

20           There are also physical limitations. The  
21 volumetric considerations we've already discussed. The  
22 proximity of landfills to pipelines, and that's relative  
23 when you consider the technical and financial hurdles we  
24 have to overcome.

25           In additions to the tens of millions it takes to

1 develop a landfill gas-to-energy project and the  
2 expected operations and maintenance there's the  
3 interconnection costs.

4           So, if a landfill is producing enough biogas to  
5 warrant justified development of a high Btu project to  
6 fuel X number of trucks, well, you also have to consider  
7 how far away is the landfill from the nearest pipeline.

8           If it's a mile, you have to establish and  
9 construct a pipeline interconnect.

10           And to show you how that's relevant here, in  
11 terms of being a hurdle, and a financial hurdle at that,  
12 our members pay anywhere from \$70,000 to \$200,000 to  
13 create these same kind of pipeline interconnections  
14 across the nation, including New York, where the Fresh  
15 Kill's Project there, now operated by the New York's  
16 Department of Sanitation has been in operation in a very  
17 densely metropolitan area for more than 30 years without  
18 incident.

19           But in California, recent quotes by our  
20 utilities are anywhere from \$1.5 to \$3 million per mile.  
21 And so you add all that on top of the existing cost and  
22 it's prohibitive.

23           And then there's energy sales and property  
24 taxes.

25           And as I alluded to earlier, there are zero

1 Federal or State tax credits, grants or subsidies to  
2 incentivize development of RNG projects in California.

3 So, in conclusion a few recommendations for  
4 government actions and, again, I'll just read them.  
5 I'll refer to our suggestions, rather, I won't bore you  
6 with the details. I'll be happy to follow up and will  
7 include more detailed attachments in our submission to  
8 the docket for this workshop.

9 But creating a renewable natural gas standard,  
10 similar to how the RPS aided development of renewable in  
11 electric power, we think a similar RNGS could benefit  
12 California's industry development.

13 Create a State vehicle mandate. As Tim's Power  
14 Point showed that we expect State and municipal fleets  
15 to increase their procurement of vehicles that are  
16 either CNG, LNG or natural gas.

17 We would add to that a mandate that requires  
18 them to procure at least 25 percent of their natural gas  
19 fuel from RNG to incentivize development of in-state  
20 resources.

21 Of course, there would be a sales tax exemption,  
22 real and person property tax exemption for RNG property,  
23 similar to the same exemptions that are available to  
24 solar projects, creating a transferrable California tax  
25 credit.

1           Grants for a specified percentage, for example  
2   30 percent of the capital cost of an RNG project, making  
3   those payable 60 days after they're online or placed in  
4   service, if you will.

5           A minimum cap and trade, provide some guarantee  
6   of debt for financial assistance.

7           A feed-in tariff, this was used successfully to  
8   increase available renewable electric power in  
9   California and other states. And I think that would be  
10   a good idea to consider here, as we're drafting your  
11   Integrated Energy Policy Report.

12           And lastly, I will pause just to read through  
13   this because it is important.

14           Provide clarification that physical  
15   transportation by displacement from biomethane is  
16   acceptable for the purpose of using renewable natural  
17   gas as a vehicle fuel in California for the Low Carbon  
18   Fuel Standard.

19           This would ensure the implementation of an  
20   approved LCFS is consistent with the rules for the  
21   Federal EPA's RFS.

22           With that, I'll leave you with our contact  
23   information and one final, shameless plug. We have our  
24   conference this December. Get away from the rain, join  
25   us on Coronado Island, where we'll be discussing, more

1 in-depth, fuel heat, power and policy applications for  
2 RNG.

3 Thank you for your time.

4 MR. OLSON: Okay, Commissioner, we have one more  
5 presentation.

6 And we kind of split up the -- we set up a  
7 vehicle kind of session here to be a little more cross-  
8 cutting, since all the rest of the presentations were  
9 more fuels.

10 And we asked Fred Silver to be part of that.  
11 He's a Vice President with CalSTART. We asked him to  
12 kind of walk through some of what we refer to as the  
13 CalHEAT roadmap for medium-duty, heavy-duty vehicle  
14 technology. And so, this is Fred Silver.

15 MR. SILVER: Thank you, Tim for inviting me here  
16 today. And thank you, Lead Commissioner and staff for  
17 hanging in here this whole time. And I hope you have  
18 the brain space to listen to what I have to say, but  
19 I'll do my best to be succinct.

20 Just to frame the area that I'm going to be  
21 talking about, you know, medium and heavy duty trucks,  
22 according to CEC data back in 2007, represent about 4  
23 percent of the vehicle population in the State, while  
24 about 16 percent of the fuel usage.

25 And the projections were for a decrease of about

1 13 percent in the light duty segment, in their fuel  
2 usage, while a 35 percent increase in the diesel  
3 segment.

4 As we know, CAFE standards for light duty are  
5 doubling by 2025, so just to heighten this interest in  
6 this area we're going to see the heavy duty and medium  
7 duty segment in fuels, and also greenhouse gases move  
8 closer to front and center in the vehicle situation.

9 So, I just wanted to frame that so you kind of  
10 have a perspective of how this fits into your larger  
11 portfolio of thinking.

12 I'm going to talk to you a little bit about this  
13 wonderful road map, the outcomes from the road map, and  
14 our recommendations going forward, and some questions at  
15 the end.

16 So, some last -- maybe, you should feel free to  
17 ask more questions so you won't be holding off the next  
18 person.

19 But what is the Center? The Center was  
20 established by the California Energy Commission under  
21 PIER Program, for the purpose of accelerating the  
22 commercialization of technologies in the medium and  
23 heavy duty truck space that will help the State meet its  
24 environmental policies.

25 Okay, and CalSTART has been very good at



1 accelerating technology over the years, so I think we're  
2 a great administer of this program and we're very  
3 excited to be working with you on it.

4 I'll get to the chase, first, and then come back  
5 to how we got here. But from a CO2, we focused a lot on  
6 CO2, but fuel economy follows very similar pathways as  
7 the greenhouse gas emissions.

8 The top red line there reflects business as  
9 usual in terms of impact data from the State, in terms  
10 of, if you're not aware, by 2050 we're going to see a  
11 225 percent increase in medium and heavy duty truck  
12 population. That's quite a challenge to work against in  
13 order to decrease the use of fuel so it's quite  
14 significant. We need to pay attention to that.

15 The road map, itself, does provide a plan that  
16 will actually get us down to the top of that orange line  
17 there in 2050. So, we're able to show very readily a 70  
18 percent reduction, while there's an 80 percent needed  
19 against the 1990 levels.

20 And with a little work with Tim, on the  
21 renewable fuels side, we think we could probably get to  
22 the 80 percent.

23 But this is an aggressive plan. It requires  
24 some significant investment by the State so if we invest  
25 through about 2023 to the 2025 time frame, we should

1 have products that are available and can live on their  
2 own in this marketplace. So, it's just different, smart  
3 investments that need to be made over the next seven  
4 years.

5           So, what is this technology road map? It's just  
6 one of many projects that were funded under the CalHEAT  
7 Truck Research Center. It's a set of technologies,  
8 about 13 technologies, each of them with staged market  
9 milestones leading to introduction by 2020, with a  
10 return on investment of about two to four years.

11           Without getting this return of investment of two  
12 to four years, we'll be subsidizing this technology  
13 forever.

14           So, we said let's focus on investing in a plan  
15 that gets us to a sustainable return on investment. And  
16 that's a big assumption and that's why the investment's  
17 need in the next seven years to do that.

18           We focus on the demonstrations, the R&D and, of  
19 course, the things that need to be done between now and  
20 2020 in order to meet 2050, because it takes forever to  
21 turn over the truck population in the State of  
22 California. That is a long-haul situation.

23           So, how do we do this? I'll go through this  
24 real fast because I'll leave you with the documents, and  
25 try to get to the outcomes.

1           We had three committees, the Technical Advisory  
2 Committee, which was made up of senior scientists  
3 throughout the country, from all the major truck makers,  
4 the truck maker suppliers, Freightliner, Eaton, Allison  
5 Transmissions, some of the fuel providers in the State,  
6 and others. But these are people who are working on  
7 technologies to actually help us move the envelope in  
8 the truck space.

9           An Advisory and Steering Committee, which was  
10 co-chaired by the PIER Commissioner here, originally  
11 Phil Meisner, if you all remember him, he's gone but not  
12 forgotten.

13           But Ray Gonzales now does an excellent job of  
14 co-chairing that committee with me, and you can see  
15 here, in reading in your spare time, the list of great  
16 members. You probably know many of them from CARB, the  
17 various air quality management districts throughout the  
18 State, and various national associations that are expert  
19 in the medium and heavy duty subject matter.

20           And then these are the Technical Advisory  
21 Committee members that are the senior scientists.  
22 They're actually on the front line, actually helping  
23 produce and commercialize these technologies. And with  
24 a little bit of help with the investment, they get to  
25 move up their greenhouse gas and environmental improved

1 fuel economy projects into the green zone, versus them  
2 kind of falling over to next year, and next year.

3 So, they were able to be very open with us on  
4 this and we aggregated that information. We did not  
5 provide details on that in the report.

6 But what we did is we took the million and a  
7 half -- we went ahead and purchased the inventory of a  
8 million and a half trucks from Polk database, a  
9 nationally recognized organization that manages for the  
10 automotive industry the number of vehicles purchased  
11 every year.

12 And we broke them down into seven -- six classes  
13 of trucks. As you can see, there's three generic  
14 classes there, 7 to 8, 3 vocational work trucks in this  
15 automotive class on the bottom. The bottom class,  
16 incidentally, we call the donut hole because it looks  
17 like the regulators aren't paying much attention in this  
18 space.

19 And because of our work with the regulators  
20 recently, we're starting to get them to realize that  
21 they were a left out element either in incentives, or  
22 some way they kind of weren't paid attention to.

23 And half of them are fleet owned, so it's not a  
24 personal vehicle in that category that we're talking  
25 about.

1           The middle three are work trucks of different  
2 types, different VMT levels, different work cycles.  
3 Some of them sit on the side of the road all day, some  
4 do a lot of travel and do a little bit of work.

5           And then, of course, the top two classes which a  
6 line haul, go coast to coast, and short haul or regional  
7 that go throughout the State, or from the port and back  
8 to IKEA, up in Bakersfield, and back again.

9           So, we broke them out and we thought that was  
10 important because the technologies really can't --  
11 there's not one size fits all.

12           And as a friend of us all remember, Jim Boyd,  
13 about the silver buckshot is needed here, not a silver  
14 bullet. So, the buckshot will cover all of these  
15 technologies and we can actually aggregate some of those  
16 buckshot and targets into these segments and be smart  
17 about our investments in the segments, and move the  
18 segments forward instead of just hoping that we move the  
19 whole industry forward.

20           So, here's your million and a half trucks. We  
21 have the VIN number for every truck in the State  
22 starting in 2010. And we had to work real hard to  
23 figure out how to classify them.

24           But you'll see in this set of charts that about  
25 12 percent of the vehicle population, which is the

1 tractors, over-the-road line haul trucks that go from  
2 coast to coast, represent 38 percent of the CO2, okay.

3 Now, you go down to the smallest class of  
4 vehicle where you have 531,000 fleet-owned vehicles,  
5 these aren't personal, passenger vehicles, representing  
6 36 percent of the fleet, representing only 12 percent,  
7 but still an important number.

8 So, you can kind of get a sense here of the CO2  
9 impact, where nearly 56 percent is in this track 7 of  
10 tractors category and another 50 percent is in the  
11 vocational truck market.

12 The vocational truck market can't be overlook,  
13 although some folks say we just need to focus on the big  
14 guys. But I think we need to focus on all of them.

15 This is just another view of that truck  
16 population, where the left side of the column is vehicle  
17 miles traveled for that fleet, for that particular  
18 class.

19 The bottom represents the population of those  
20 trucks.

21 And the circumference represents the amount of  
22 CO2 from that vehicle population in the State.

23 We also did this by NOx because a lot of our --  
24 we had to address NOx, a big component. And as you  
25 know, your sister agency, CARB, is very focused on a low

1 NOx standard.

2           So, we have two regions of the State, Central  
3 Valley and South Coast, which are extreme nonattainment,  
4 with the need to drive ozone down by 95 percent, so we  
5 need near zero emission kind of technology when it comes  
6 to NOx. So, we wanted to pay attention to that in our  
7 road map, and we did address that in our development  
8 strategy.

9           We didn't want to leave that stranded and just  
10 focus on fuel economy, so our road map does include the  
11 elements to do both, okay, in there.

12           These are the technologies that we focused on,  
13 19 technologies. We broke them into three different  
14 categories, advanced electrification, engine and  
15 driveline efficiency, and chassis, body and roadway  
16 systems.

17           The top two major categories we addressed with  
18 individual road maps in the report. There is a road map  
19 for each of those 14 or 13 top bullets to show you what  
20 needs to be done, what kind of investment needs to be  
21 made over the next seven years to get us to a two- to  
22 four-year payback by 2020, so we don't need to come to  
23 the bank anymore and we can meet our 2050 objectives.

24           Okay, we did also model the bottom six in our  
25 modeling work, but we did not have the resources at the

1 time to develop an activity, and we felt there was  
2 enough, at least for the moment, momentum moving in that  
3 space that we could just model that for the moment and  
4 we get the best bang for our buck by focusing on the top  
5 13.

6 This is an example of a road map. This is for  
7 hybrid electric, as an example, and then it goes into  
8 pages of description of it.

9 But each of these windows on the top represent  
10 four stages of technology that we need to move the  
11 hybrid electrics through in the truck world by 2020,  
12 ultimately resulting in a two- to four-year payback,  
13 with different functionalities in each of those phases.

14 And in the bottom the actions that it would take  
15 to move from stage one, to stage two, to stage three and  
16 to stage four.

17 And we actually modeled the investment for this,  
18 resulting in about, overall for all the 13 technologies,  
19 something like about \$500 million worth of investment  
20 between now and 2020 to do what we need to do by 2050.

21 Okay, so we still do need AB 118 funds to focus  
22 on the heavy duty market segments, otherwise we're not  
23 going to make it.

24 These are the kind of actions that we focused  
25 on, studies, R&D, pilot demos, and pre-commercial demos,



1 and deployment incentives.

2 The AB 118 very focused on the right side. EPIC  
3 and PIER a little bit focused on the left side. There's  
4 a little bit of a mis-balance on that. I'm going to  
5 talk about that on the end.

6 We also modeled the biofuel and renewable fuel  
7 element into our modeling work that you saw, you saw the  
8 CO2 reductions. That did include these assumptions.  
9 Electricity is doing great. And we do see a lot of  
10 papers talking about how we're going to get to much  
11 higher amounts in that segment.

12 Hydrogen is right behind that. As you know,  
13 hydrogen in transportation also has a regulation in the  
14 State that requires 33 percent renewable, so that's a  
15 done deal, so we included that.

16 We're kind of weak in the space on biofuel  
17 additions and I keep pestering Tim to tell me more so I  
18 can help figure out how we can knock that number up the  
19 next time we kind of do this, so it's a little bit  
20 moderate there.

21 But when we used this assumption, roughly we got  
22 about 50 percent of our CO2 reduction from renewable  
23 fuels and about 50 percent from technology insertion.  
24 So, I think that's important kind of -- we need both.  
25 We can't do it with one, without the other.

1           So, I'm not going to walk through this chart  
2 just a lot, but I'll get to this. These are some of the  
3 outcomes. We did model. We took those 13 technologies  
4 and we aggregated them into six driveline solutions  
5 because these technologies sometimes work together, like  
6 waste heat recovery and electric accessories you  
7 wouldn't buy separately, you'd buy them together.

8           So, we aggregated them into six different  
9 driveline strategies and you can see they're different  
10 for -- the options are different for each of the truck  
11 classes.

12           There are much fewer options in the line haul  
13 truck, which is the OTR truck. We're not going to see  
14 pure electric trucks, which is the XEV. That doesn't  
15 show in that category. But we will see some mild  
16 hybridization in that space.

17           But while you see in the vocational segments,  
18 like Class 3A, which is a vocational truck, there are  
19 lots of options there because there are so many duty  
20 cycles and opportunities for stop and start to electrify  
21 that technology.

22           So, this blue zone here is basically baseline,  
23 but baseline is pretty significant. We didn't assume  
24 that it stays the same. It's your super truck  
25 technologies. If you follow super truck, the DOE's

1 focused on much more efficient truck technologies, but  
2 they're only about 10 or 15 percent more efficient.  
3 They're not going to get us there, okay.

4 We need 200 percent more efficient trucks which  
5 our technology advisors say we can do, okay, as we look  
6 at the truck as a system basis, not just as an engine.

7 But so baseline will improve efficiency, but  
8 won't get us there, so we need these other elements like  
9 new combustion technologies, like opposed piston  
10 engines, cam-less engines, advanced turbines and  
11 electric drive on the electrification of its fuel cells  
12 to overcome the fact that the baseline will improve  
13 efficiency, but just won't get us all the way to what  
14 the State of California needs done.

15 This is looking at it on an aggregate basis.  
16 And we're back here, again, to what our result is.

17 You can see again here, by 2050 the tractors  
18 over-the-road still represent, that's that second little  
19 wave there from the top, in color, the second in lighter  
20 blue, it still represents quite a segment of our CO2  
21 emissions, but we've made considerable dents in that as  
22 well, as well as everything else. But still, it is  
23 right in the forefront of what we need to pay attention  
24 to.

25 So, here are some assumptions that you need to

1 think about. First of all, the road map assumes greater  
2 than two times fuel economy improvement standards to be  
3 established by NHTSA and EPA. And I've already had four  
4 meetings with them on our work from the CEC, thank you.  
5 They're thanking -- through me, they're thanking you for  
6 funding me.

7           They've already taken our road map, they've  
8 taken our model and they're working with it. I met with  
9 them today again here, they're meeting with folks at the  
10 Hyatt this morning, so I did get a chance to present and  
11 do a deeper dive with them today.

12           And just reminding them without two times fuel  
13 economy we can -- and we all know here, we've probably  
14 lost 10 to 15 years of meeting any of our goals.

15           So, we need aggressive fuel standards in this  
16 medium and heavy duty segment to succeed to meet our  
17 2050 goals. Otherwise, there's just not enough  
18 investment. There will be evolutionary improvement, but  
19 not the revolutionary change that our -- incidentally,  
20 our technology advisors say can occur, but they need to  
21 be incentivized to do that.

22           So, that's an important takeaway.

23           Just in terms of makeup of these different kinds  
24 of trucks, growth area, I mean the State of California  
25 is doing an outstanding job at employing electrified

1 trucks.

2 I don't know if you know, two-thirds of all the  
3 electric trucks in the State -- in the nation have been  
4 fielded here in the State of California through its AB  
5 118 Program, under the Incentive Voucher Program.

6 So, we're getting all that play here and it's  
7 established a growing market. Some folks have actually  
8 moved here as a result of that, from Colorado and  
9 others, to establish manufacturing plants in the State  
10 of California.

11 So, this is a growth area and we would  
12 estimate -- this is purely estimations because these  
13 numbers are our best estimates, that by 2050 40 percent  
14 of the truck population could be electrified along these  
15 elements, pure EVs, plug-in hybrids, dual modes,  
16 especially down in the zero emission corridor and the  
17 Ports of L.A., hybridization, fuel cell range extended,  
18 electrified accessories and electric power takeoff.

19 So, those kind of elements we can see a very  
20 significant amount of our population makeup by 2050 if  
21 we invest smartly in the right technologies here. And  
22 that is a growth area, it's moving. And thank you to AB  
23 118 that it's able to actually start moving in a  
24 commercial sense.

25 So, other growth areas we're seeing, the

1   hydraulic hybrid market, which is more of a mechanical  
2   hybrid, not an electric hybrid, we're going to see  
3   some -- we project some growth in that market, as well,  
4   especially in the refuse truck sector.

5           We're not going to displace this wonderful  
6   natural gas fuel that's being put in there. There's not  
7   enough money to save in terms of natural gas fuel by  
8   hybridizing.

9           But the hydraulics are providing a 5 to 10  
10   percent improved productivity on the number of stops  
11   that a refuse truck can make per day.

12           What does that mean? That means that a refuse  
13   truck fleet could use 5 to 10 percent less vehicles. So  
14   the payback isn't being necessarily by the fuel, which  
15   will be saved from this, but is being made by  
16   productivity gains because the fleet doesn't need as  
17   many vehicles.

18           So, we're going to see that mostly in the refuse  
19   segment and some heavy delivery.

20           The space that we need more attention spent on,  
21   and we have some great suppliers here in the State of  
22   California, we need 15 to 20 percent of our technology  
23   to be new combustion technology. We need to get away  
24   from the conventional piston engine and move to things  
25   like opposed piston engines.

1           In fact, one of the premier organizations in the  
2 nation is located down in San Diego, Achates Power, who  
3 has been chosen by the U.S. Army to do their next  
4 generation engine because the Army, you know, has the  
5 largest fleet of vehicles and fuel economy is right up  
6 at the top of their list of issues to solve.

7           But, yet, we're not getting them to do it here  
8 in the State of California.

9           So, I encourage us to visit this organization  
10 and see how we can work with them to 25 percent  
11 improvement in fuel economy versus just 10 percent being  
12 made by super truck.

13           CAM-less engine technology, we need to move to  
14 the digital age of controlling engines. Right now  
15 they're analog controls. We all know what happened when  
16 we went from analog to digital in the computer error,  
17 and we need to do the same thing with engines.

18           And there's an opportunity, again, another 25  
19 percent fuel economy gains there.

20           The company that stands behind that one is  
21 called Sturman Engineerin. They're in Colorado.  
22 They've worked with Navistar for many years, and they've  
23 got now the interest of Wal-Mart to do some work here in  
24 the State of California with the ports.

25           So, these are some new combustion components.

1 And another company called Brayton, which the CEC is  
2 wisely funding under PIER Project, an AB 118 Project,  
3 which is a parallel turbine, which can produce  
4 simultaneous low NOx, which is what CARB, your sister  
5 agency wants.

6 So, this is an area we think needs more  
7 attention to.

8 And then diminishing growth, a driven -- again,  
9 we don't want to indicate that this isn't an important  
10 segment. We need Cummins and the engines to continue to  
11 improve. Right now that's being driven mostly by the  
12 super truck technologies that are rolling out, waste  
13 heat recovery which can now electrify your electric  
14 auxiliaries and you can downsize the engine in the long  
15 term.

16 So, we see, though, a diminishing return. We  
17 have an aggressive plan. If we can get the investment,  
18 if we can EPA and NHTSA to line up with two times fuel  
19 economy and we continue to make smart investments, we  
20 think we can get there. Without that, I think all bets  
21 are off.

22 So, just some final notes here for  
23 recommendations. While we need -- this chart, again,  
24 points out the fact that 38 percent, maybe 56 percent of  
25 the problem is with the over-the-road trucks, none of



1 the agencies are really investing in that space wisely.  
2 Everybody's relying on super truck to produce these  
3 technologies that could be very readily closeted because  
4 the industry standards are created to pull them out of  
5 the closet, it's very likely that only a few cherries  
6 will be pulled out of that sack.

7           So, we need a process to help. And the first  
8 place to do that is to pull these technologies here.  
9 I've already waved my hand and said I'll try and help  
10 you partner and do that first in California.

11           So, the other 50 percent, of course, in those  
12 vocational trucks.

13           So, this here talks about some enabling  
14 technologies for Class A trucks. We have an issue with  
15 the AB 118, which is interesting, and I'm always told  
16 that if they can't really deal with a 40 percent fuel  
17 economy gain reduction I can't fund it.

18           Well, the problem is there are enabling elements  
19 to get to the 40 percent, like DC to DC converters,  
20 auxiliary drives, waste heat recovery, which each  
21 measures 3, 5, 7 percent. When combined together, we  
22 can get to the 25, 30 or 40 percent.

23           But AB 118 and the CEC doesn't seem to be able  
24 to understand these enablers that will get you there,  
25 and there's no way to fund that other than PIER, and

1 PIER is very limited on its funding, so it doesn't  
2 really have the nice space to address some of these  
3 enabling elements in their pot of transportation funds.

4           So, I wanted to point that out as something that  
5 we need to look at that. Is that an unwritten policy?  
6 Is that just kind of a cultural issue? Or is that  
7 something that's written, cast in concrete that it has  
8 to be such an aggregate amount that you -- and what  
9 we're getting is we're getting a lot of up-fitters just  
10 putting stuff together to make it work, but we're not  
11 getting commercial products out there rapidly enough to  
12 do that.

13           So, I bring you to this note here. This comes  
14 back to these action items, again.

15           On the left side, those are the kind of action  
16 items, and you can argue where that red line should fit,  
17 that EPIC and PIER Fund, maybe about \$10 million a year.  
18 I don't know if that number's exactly right for  
19 transportation.

20           The right side you've got a very nice \$100  
21 million a year, but the right side is focused mostly on  
22 pre-commercial and deployment incentives. Very little  
23 of that is focused on development.

24           And I talked about these enabling technologies  
25 that need to be commercialized. We need to move that

1 line a little bit to the left, I think. I don't know  
2 how to get that message out, other than to speak to the  
3 Commissioners here and say can you move the line a  
4 little to the left and get a little bit of development  
5 funding to enable these technologies so we can  
6 commercialize them, aggregate them, and then get you the  
7 40 percent with real manufacturers of real products in  
8 the long term.

9           Here are some other follow-on activities,  
10 biofuel, we've thought again in this area, and we were a  
11 little concerned that the biofuel adoption rate and  
12 interest, other than the electric side, on the natural  
13 gas side, and the renewable diesel side.

14           The fleets just don't know about this stuff.  
15 There's not a lot of traction going on in this space.  
16 We don't see there's a lot there. And there's a lot of  
17 great stuff happening, but nobody's connecting the  
18 fleets to the fuel.

19           We think there's a need to develop what we call  
20 kind of an adoption plan as a follow on to make that  
21 connection so we can go from 20 percent, which is what  
22 we're projecting in the out years, to 30 percent. That  
23 would just throw us right into the ability to meet our  
24 greenhouse gas goals very nicely.

25           Vehicle miles traveled, 225 percent growth

1 through 2050. Wow, we're working against a real uphill  
2 battle. So, how can we reduce VMT? There are ways to  
3 do it. There are ways to look at new regulations, like  
4 longer and heavier trucks, which had been kind of  
5 forbidden or verboten for a long time.

6 But there are ways to connect trucks. IT has  
7 connected smart trucks.

8 Technology, there's a company called Peloton who  
9 can actually connect trucks through a link. They can  
10 link up virtually. The one in the front drives the  
11 second one and you can actually save about 20 percent  
12 fuel because of the drag savings of the two trailers  
13 being connected.

14 And with the zero emission truck work that's  
15 being done in Southern California, and the interest in  
16 maybe doing some of this in the Central Valley, we could  
17 actually start using some of those connected-truck  
18 technologies to refuel.

19 We need to think outside of the vehicle a little  
20 bit. As well, I don't think anybody's paying attention  
21 to that, that space.

22 We think since Class A truck is not getting the  
23 attention needed from the State in terms of moving  
24 forward, we really think that there's a need for a  
25 Center of Excellence for Class A trucks, especially in

1 the San Joaquin Valley. We'd love to lead that effort  
2 and work, and commercialize, and specifically focus on  
3 fleets that go coast to coast, and further electrify  
4 those trucks faster than we otherwise would have been.  
5 Because right now, if we wait for super truck, I don't  
6 think we're going to get there.

7 We need to start actually adopting some of that  
8 now, deploying it, do some pilot demos and getting the  
9 fleets excited about that. Otherwise, we're going to  
10 lose five years of waiting in that space.

11 Since we'd also focus on using natural gas, it's  
12 real key to being an enabler for the low NOx solution  
13 that's required by the State. Also by using renewable  
14 natural gas, which we know is limited, and combining it  
15 in a CNG hybrid, we can now maximize the use of that  
16 fuel. And we talk about that in our report.

17 We'll have a report coming out very shortly on  
18 hybridizing alternative fuel solutions and it works real  
19 well when you use renewable fuels because there's a  
20 limited source there and you can maximize your limited  
21 use of a valuable resource.

22 And then the implementation of the road map. We  
23 have 66 steps, and the way you'll remember that is  
24 because of Route 66 in the State, so you won't forget  
25 that there are 66 steps.

1           We need to implement those steps. We think that  
2   it's important that in some way CalHEAT be continued to  
3   implement those steps to work with its partners.

4           So, I'll leave you with that. That might be the  
5   truck we come out with, here in this picture, in the  
6   Center of Excellence from the State.

7           And I thank you all for listening to me in this  
8   last presentation.

9           COMMISSIONER SCOTT: Thank you for coming and  
10   for that terrific close-out presentation. I think that  
11   was great.

12          I have just one quick clarifying question and  
13   I'll save the rest of another time.

14          But you mentioned that there was a potential for  
15   a 225 percent growth in the truck VMT?

16          MR. SILVER: Yes.

17          COMMISSIONER SCOTT: Is that under sort of a  
18   business-as-usual scenario or what's the -- what is  
19   the --

20          MR. SILVER: IMFACT is there's a State set of  
21   data that you create, so I'm not exactly sure how that's  
22   computed. Do you know, Tim? IMFACT, are you familiar  
23   with that?

24          MR. OLSON: Yeah, and Mike Waugh here probably  
25   knows more about this than I do.

1           IMFACT is a kind of a predictive model for  
2   emissions going forward in the future and is used for  
3   mostly criteria pollutants. Is that correct, Mike  
4   for -- and they do kind of scenario development of  
5   engines, technologies, vehicles.

6           MR. SILVER: So, we do have a nice solution on  
7   the table that we haven't even touched, which is how do  
8   we reduce that data?

9           And we don't have the road space to deal with  
10   225 percent truck growth. Thank you.

11          MR. OLSON: Very good, so I think we're -- we  
12   agreed to have a public comment at the end of this.  
13   We're finished with our presentations and maybe in the  
14   room, if there are questions in the room or comments in  
15   the room?

16          We do have one comment online, one question  
17   online. Is that the phone or just --

18          MS. KOROSEC: It's Roger Gault.

19          MR. GAULT: Yes, this is Roger Gault with Truck  
20   and Engine Manufacturers Association.

21          Just, I guess, a quick comment. It seemed like  
22   virtually all of the presentations that we heard  
23   throughout the day today, that made comparisons and  
24   projections regarding primarily alternative fuels, all  
25   seemed to gravitate based on the current petroleum

1 pricing structure. Oh, there was a little bit of, you  
2 know, influx in some of the presentations.

3 But I think it should be clear to everybody that  
4 as the petroleum usage goes down through driving the  
5 alternatives that the petroleum price will go down, at  
6 least quite likely will go down.

7 And so if, in fact, these alternative scenarios  
8 are being predicted by price differential, you have to  
9 be very careful that you don't end up un-funding or  
10 defunding, if you want to call it that, the incentive to  
11 do what it is that you're trying to do.

12 And I'm not suggesting that there's an answer  
13 for that, but it's a little bit misleading to talk  
14 about, say, the current price disparity between diesel  
15 fuel and natural gas as being a long term growth  
16 strategy whereby petroleum goes away by 50 percent if,  
17 in fact, that 50 percent reduction in petroleum results  
18 in a 50 percent reduction in cost because you end up in  
19 that price point where natural gas doesn't make sense  
20 anymore pretty fast.

21 Similarly with electric, the electric versus  
22 petroleum pricing chart that I remember seeing, where  
23 there was a lot of noise in the petroleum side, it gets  
24 a lot closer to the electric side as you start taking  
25 away that price volume driver.



1           So, just something to keep in mind as you're  
2   looking at different scenarios going forward. It seemed  
3   like that's something that was missing from virtually  
4   all of the analyses I saw.

5           MR. OLSON: Roger, this is Tim Olson. Thanks  
6   for the comment and I think your point that it was  
7   missing -- that's something we want to look into because  
8   some of the presenters did present more than one  
9   scenario based on low, medium, high petroleum prices.

10          And I don't -- I just remember one, is the  
11   biodiesel, the CBA presentation did note a low  
12   petroleum -- actually, it would be a low-price petroleum  
13   scenario, where biodiesel has less impact or less market  
14   penetration.

15          MR. GAULT: I think in that case it had low, the  
16   low was not much lower than today, it just didn't  
17   increase.

18          MR. OLSON: I think it was below \$50-a-barrel  
19   oil.

20          MR. GAULT: Oh, was it. I didn't remember  
21   seeing that one.

22          MR. OLSON: Yeah. Another point to make,  
23   historically, the Energy Commission's fuel price  
24   forecasts have shown, and we think that this is going to  
25   be true in this next round here, as we finish this work

1 over the next month, that we see a definite decline in  
2 gasoline consumption over time, and we see increase in  
3 demand for diesel, at least 1 to 2 percent per year.

4 The price of petroleum, as you know, the  
5 international commodity price has not a lot of control  
6 in this State government or this country in that until  
7 we have more supply.

8 And whereas there's a comparison, Rosa  
9 Dominguez-Faus' presentation, when you look at the  
10 background paper you'll see natural gas pricing in North  
11 America is different than Japan, Europe, most other  
12 continental pricing. And that differential is something  
13 that's unique to North America.

14 So, that's why we're kind of -- we're looking at  
15 this, trying to hedge this and look at how long will  
16 that natural gas, moderately low natural gas price be in  
17 effect compared to petroleum prices. And, of course,  
18 it's compared to high, medium and low.

19 And you're right, it needs a lot more kind of  
20 analysis. The dimensions of those comparisons need to  
21 be looked at carefully.

22 Appreciate your comment.

23 MR. GAULT: Thank you.

24 MR. OLSON: Any other comments in the room here  
25 or online?

1           So, that's it. We had lots of information and a  
2 definite fire hose today of data and information coming  
3 in.

4           Just again, to repeat, August 9th is our  
5 deadline for comments due to us on this workshop. Of  
6 course, the Transportation Section, we have another  
7 workshop on August 21st and, hopefully, we'll have  
8 information gathered today, considered and included in  
9 our analysis for that Transportation Section.

10           COMMISSIONER SCOTT: Absolutely. And before we  
11 close can I just add a thanks to Tim and his team for  
12 putting together for us what was, I thought, a robust, a  
13 really robust set of thought-provoking presentations.  
14 It was an ambitious agenda, but we're only about 15, 20  
15 minutes behind, which is kind of where we were all day.

16           And so, you know, I appreciate the hardy band of  
17 folks who are still here in the room, and on the phone,  
18 and much appreciation to Tim and his team for putting  
19 such a terrific agenda together.

20           And to Suzanne and Lynette for always helping us  
21 have such terrific workshops.

22           And I just wanted to say, you know, we're  
23 thinking a lot about how to transform our Transportation  
24 Sector to help achieve our clean air and public health  
25 goals, to help achieve our climate goals, and to

1 increase the secure sources of energy.

2           And it's pretty heartening for me to see and  
3   hear kind of the theme throughout the day of the various  
4   growth scenarios of the alternative fuels, the  
5   alternative vehicles that are going to help us to get  
6   there.

7           And I would just add one reminder to folks that  
8 if you have questions, because we didn't have a lot of  
9 time for questions, Tim has graciously volunteered to  
10 help folks find answers, and so you could e-mail those  
11 to him and second his call for good comments, because we  
12 heard a lot of really great ideas around the room today.

13                   And so I hope that you will get them in writing  
14   to us by August 9th.

15           That's all, thank you everyone for being here.

16   It was a good day.

17 (Thereupon, the Workshop was adjourned at  
18 4:55 p.m.)

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