TRANSPORTATION COMMITTEE WORKSHOP

BEFORE THE

CALIFORNIA ENERGY RESOURCES CONSERVATION

AND DEVELOPMENT COMMISSION

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| In the Matter of: ) | |
| ) | |
| Informational Proceeding and ) | Docket No. |
| Preparation of the State Plan ) | 06-AFP-1 |
| to Increase the Use of ) | |
| Alternative Transportation ) | |
| Fuels ) | |
| ____________________________) | |

CALIFORNIA ENERGY COMMISSION

HEARING ROOM A

1516 NINTH STREET

SACRAMENTO, CALIFORNIA

THURSDAY, MAY 31, 2007

9:00 A.M.

Reported by:
Richard A. Friant
Contract Number: 150-04-002

CEC COMMISSIONERS PRESENT

James D. Boyd, Presiding Member

Jeffrey D. Byron, Associate Member

Jackalyne Pfannenstiel, Chair

CARB MEMBERS PRESENT

Robert F. Sawyer, PhD, Chair

CEC ADVISORS PRESENT

Susan Brown

Melissa Jones

CARB ADVISORS PRESENT

Susan Fischer

CEC STAFF AND CONTRACTORS PRESENT

McKinley Addy

Erin Bright

Asish Gautam

Matthew Hooks, TIAX, LLC

Michael Jackson, TIAX, LLC

Bryan Jenkins, University of California, Davis
California Biomass Collaborative

Tim Olson

Dan Sperling, PhD, University of California, Davis
Institute of Transportation Studies

Robert Stumberg, Harrison Institute for Public Law
Georgetown University Law Center

CEC STAFF AND CONTRACTORS PRESENT (CONTINUED)

Claire Vallotton, PhD, Zetetic Associates, Inc.

Larry Waterland, TIAX, LLC

Franklin "Jerry" Wiens

Gary Yowell

CARB STAFF PRESENT

Gerhard Achtelik

Analisa Bevan

Mike Scheible

ALSO PRESENT

David A. Modisette, representing the California Electric Transportation Coalition (CETC)

Mark P. Sweeney, representing the California Natural Gas Vehicle Coalition (CNGVC)

Mitchell W. Pratt, Clean Energy (CE)

Patricia Monahan, Union of Concerned Scientists

Bill Van Amburg, WestStart-CALSTART

David A. Smith, BP America Inc.

Anna Halpern-Lande, Tellurian Biodiesel and Environmental Entrepreneurs

Mike Eaves, California Natural Gas Vehicle Coalition (CNGVC)

Joe Vollmer, Sturman Industries (SI)

Charlie Ker, Westport Innovations Inc. (WII)

James E. Larson, Pacific Gas & Electric Company (PG&E)

ALSO PRESENT

Edwin Harte, Southern California Gas Company/San Diego Gas & Electric (SDG&E)

Charles Powers, St. Croix Research

John Nadeau, Hythane Company LLC

Lesley Brown Garland, Western Propane Gas Association (WPGA)

Rob Mercer, IMPCO Technologies (IMPCO)

Bob Meyers, Western Propane Gas Association (WPGA) (via telephone)

Brian Feehan, Propane Education Research Council (PERC) (via telephone)

Eric Bates, Ferrell Gas & Propane (via telephone)

William Platz, Delta Liquid Energy (DLE) (via telephone)

Christopher Yang, PhD, University of California, Davis, Institute of Transportation Studies (UCD)

Stephen Ellis, American Honda Motors (AHM) (via telephone)

Michael Petras, Enagra Inc. (EI)

Robert Jagunich, Biofuels, Logistics & Terminal, LLC

Richard Peterson, Alaska Natural Resources to Liquids

Cal Hodge, A Second Opinion, Inc.

Harry Simpson, Crimson Renewable Energy

Joe Sparano, Western States Petroleum Association

Jason L. Pyle, MD, PhD, Sapphire Energy

Paul Wuebben, South Coast Air Quality Management District

ALSO PRESENT

Al Jessel, Chevron Products Company

Dominic DiCicco, Ford Motor Company (via telephone)

Bob Reynolds, Downstream Alternatives, Inc. (via telephone)

Jon Van Bogart, Clean Fuel USA and California Ethanol Vehicle Coalition

Jamie Knapp, J Knapp Communications

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P R O C E E D I N G S

9:12 a.m.

CHAIRPERSON PFANNENSTIEL: Good morning and welcome. This is a joint workshop between the California Energy Commission and the California Air Resources Board. And even within the Energy Commission it is a joint workshop between the Integrated Energy Policy Report Committee and the Transportation Committee.

We have a very full day, a full agenda, so we will kick it off quickly. Let me make some introductions on the dais. I am Jackie Pfannenstiel, the Chair of the Energy Commission and the Presiding Commissioner on the Integrated Energy Policy Report Committee.

To my right is the Commission's Vice-Chair and the Presiding Commissioner on the Transportation Committee, Jim Boyd. To Jim's right is Commissioner Jeff Byron who is the Associate Member of the Transportation Committee. Who else is here? To Jeff's right is Susan Brown who is Commissioner Boyd's advisor.

And then we are fortunate to have with us today the Chair of the California Air Resources Board, Bob Sawyer, to my left. And to Bob's left is his advisor (loud noise) -- Are you okay?

ARB CHAIRMAN SAWYER: Yes, I'm fine. Just embarrassed.

(Laughter).

CHAIRPERSON PFANNENSTIEL: That's okay, as long as you're okay.

ARB CHAIRMAN SAWYER: Our chairs are not on wheels.

CHAIRPERSON PFANNENSTIEL: To Bob's left is his advisor, Susan Fischer. And to Susan's left is Melissa Jones, who is the advisor to Commissioner Geesman who was not able to be here today. That's who we are. Let me start by seeing if there are some opening comments from Commissioner Boyd.

PRESIDING COMMISSIONER BOYD: Well thank you and good morning everybody. Good morning in particular to our partners, the Air Resources Board and Chairman Sawyer and the many staff members whom many of us have spent many hours with over the past several months in the work going on to formulate this report, the Alternative Transportation Fuel Plan that was called for by Assembly bill 1007 passed in 2005 and authored by Assemblywoman Pavley.

Before handing the meeting over to the staff to begin I have several comments, introductory comments I would like to make. But I would like to offer the courtesy to Chairman Sawyer if there's any comments he'd like to make on behalf of the Air Resources Board.

ARB CHAIRMAN SAWYER: Thank you, Jim.

First of all I want to thank the CEC team. I've met with you occasionally during the past year and I know how much work you've put into this effort and really appreciate it for taking the leadership and all the staff work behind it.

And I think I should also thank the group from TIAX who are the lead contractors and for the work which they have done. I have been able to read their report and it really is impressive the job that they have done in collecting the information together in a very clear, technologically sound way.

The importance of the AB 1007 report I think is much greater than we anticipated a year ago when the task began. It lays out the scientific and technological background for establishing alternative fuel policy for the state of California, and eventually regulations which the Air Resources Board will be adopting as part of the AB 32 process.

And I don't think anybody anticipated this but it also reflects and incorporates the UC Berkeley/UC Davis study of how a low-carbon fuel standard might take place, which certainly is closely related to alternative fuels.

The alternative fuels policy of California will be a very important part of our environmental, energy security, economic growth future but it is not the only part of it. Certainly issues of vehicle efficiency will be an important part. We just spent the full day yesterday arguing our case for a waiver to implement the greenhouse gas standards, the AB 1493 Pavley Act standards.

And in the long term I note that there is indeed some vision of what 2050 might look like in this area. Areas such as VMT reduction are going to be an important part of the long-term policy for the state of California.

I think it also is quite obvious that we are going to need a very broad research portfolio to advance the technology of alternative fuels to insure that the fuels that we get are really low-carbon fuels.

We're pushing into areas in which the technology really isn't matured yet and we need that technology. Fortunately the California university community and scientific institutions are geared up to help move ahead.

So I think the bottom line is that this is going to be a decision-making tool for us. It's going to be very valuable. And I am confident that it will move ahead, I hope according to the deadlines. But it is more important that we get it right. And again thank you, CEC, for all the work that you have done in this area.

My staff is certainly available to help wherever it can in wrapping up the final details and we will bring the resources which will be useful to you in doing that.

PRESIDING COMMISSIONER BOYD: Well thank you very much. Thank you very much, Chairman Sawyer. It has been a pleasure for me to know and work with you for more decades than I'll admit to this audience.

Commissioner Byron, would you like to say anything?

ASSOCIATE MEMBER BYRON: No, I'm okay.

PRESIDING COMMISSIONER BOYD: All right. I have a few opening remarks because I turn control of the agenda over to Tim Olson who is anxiously standing at the podium there.

First I would just note that the hearing notice for today's event provides a fairly decent explanation of what we're about and the purposes and goals of the workshop. So I won't go into that but I know Tim will elaborate on that a little bit more.

Also there is an April 28, 2006 Scoping Order, and Energy Commission Scoping Order, for those of you interested in history on AB 1007, that provides a lot of background on the approach that the Energy Commission saw that it would take in fulfilling the requirements of AB 1007.

I'd like to note that this is actually the second major workshop on the subject of the Alternative Transportation Fuels Plan. We held a workshop in March, March 2 to be exact, on the full-fuel cycle analysis, which turned out to be a rousing workshop with lots of confusion as to whether that was the whole enchilada or whether there was a lot more coming. But as you see now there was a lot more coming.

And the staffs of our two agencies I know have been, have had numerous, extremely numerous meetings with stakeholders throughout this time period since last March. So in an effort to finish this report on time by the end of June there has been an exhaustive, and I do mean exhausting for the staff, effort to reach out and touch everybody as much as possible.

Secondly I'd like to just provide a little bit of background and context for this exercise because as Chairman Sawyer has already said, this effort does not stand alone. And as we have learned very much so in this new century, so many things are linked together. In fact you can't push the item anywhere without something popping up somewhere else. We really are in the era of full systems analysis in order to understand actions that are taken.

The Governor and the Legislature have been active in the areas that affect transportation fuels in California for quite some time now, as you've observed. There are a number of programs and Governor's initiatives that are related and/or affect each other, and of course affect this subject as I indicated.

In 2003 our same two agencies produced a report at the request of the Legislature entitled Reducing California's Petroleum Dependence, which responded a wide, public concern about gasoline and diesel fuel price volatility issues that were occurring at that time at the turn of this new century, and quite frankly have been present ever since.

This report documented the fact that California's continually growing appetite for transportation fuel was outstripping the industry's ability to provide sufficient supplies to keep fuel prices at their historic world low levels. Demand was outstripping supply of finished product. And I haven't seen anything change in the last several years to change that fact.

This report suggested a wide range of actions by the state aimed at reducing our dependance on petroleum and the need to import oil, and to address the demand/supply price volatility problem that was besetting California by suggesting a menu of actions including encouraging a significant increase in the efficiency of motor vehicles, measures to reduce VMT as mentioned by Chairman Sawyer, the introduction of new vehicle technologies and the introduction of a diversified menu of alternative fuels.

These facts and recommendations were addressed and amplified in the Energy Commission's newly instituted and starting in 2003 Integrated Energy Policy Reports and were hammered home again even more so in the 2005 Integrated Energy Policy Report of this agency.

The Governor in 2005 echoed the sentiments of these reports in his letter commenting on the IEPR calling for an alternative fuels plan for California, specifically requesting the CEC provide him recommendations for a biofuels plan by March of 2006, and indicating a support for proposed legislation, AB 1007, that called for a statewide alternative transportation fuels plan, which is of course why we are here together today.

In 2006 the Governor upon receipt of the Energy Commission's recommendations for a bioenergy/biofuels plan issued an executive order establishing goals and objectives and calling for an action plan, which he received and approved in

July of 2006.

So the stage was set for actions to address California's growing transportation fuel supply gap and resultant price volatility by advocating vehicle efficiency, calling for the introduction of advanced vehicle technologies and by taking steps to add to supply and to diversify supply through the introduction of alternatives. All to be done in consideration of California's desire to protect and enhance its environment.

At that point in time the passage of AB 32 heralded the introduction of climate change and greenhouse gas reductions to California's program. And with the Governor's low-carbon fuel standard initiative we round the parameters of the AB 1007 plan effort before us today, as Chairman Sawyer has noted.

The full-fuel cycle analysis done as part of this alternative transportation fuel plan to address environmental considerations in accordance with the provisions of AB 1007 becomes now a major component of the ARB's work to recommend a low-carbon fuel standard.

And the Governor's low-carbon fuel standard executive order calls upon the Energy

Commission to incorporate as appropriate the low-carbon fuel standard compliance schedule into the state alternative fuels plan. And upon adoption by the Commission submit the plan to the ARB for its consideration.

Thus we have seen that all the activities are linked. It's a great system of connected actions and interactions and therefore leaves us with a very complex situation to deal with.

So with that, Mr. Olson, I will turn the agenda over to you.

MR. OLSON: Okay, thank you very much, Commissioners. What I would like to do is to start off and kind of save a little time. Start off by describing what our original objective was and what we want to try to address today in the workshop. And then I'll describe kind of what we're going through in terms of the presentations throughout the whole day.

To kind of reiterate Commissioner Boyd's comment, this has been a very interactive workshop between the -- project with the Air Resources Board. There have been several other agencies involved in this too as we have gathered information, conducted meetings and basically seeking feedback from lots of different people throughout California and other parts of the United States.

This report, AB 1007, stems from the original AB 2076's report and law from 2003. And the main thrust of this is to fulfill the petroleum reduction goals that were adopted by the Energy Commission and CARB a few years ago. In the course of doing this, as Commissioner Boyd mentioned, there were other policy options that emerged and we're trying to reflect that in this report. The greenhouse gas emission reductions from AB 32 and the initiatives and bioenergy plan and the more recent low-carbon fuel standard executive order.

The plan, to just refresh your memory on what the reduction goals are. In 2003 the goals were adopted by both agencies to reduce on-road gasoline and diesel demand 15 percent below 2003 levels by the year 2020. The second part of that was that those goals included 20 percent of the on-road fuel consumption in 2020 would come from alternative fuels and 30 percent in 2030. Those are very big challenges. And in essence what AB

1007 tells us to do is now come up with a plan on how to get to those, meet those goals.

The legislation required that we do this analysis in a slightly different way than in the past to include the full-fuel cycle analysis, which covered the greenhouse gas emissions, the criteria pollutants, toxics and multi-media impacts of all options, gasoline, diesel and all the alternative fuels. And in a way where there is no net material increase in air pollution, water pollution and damage to human health.

That is a big task and we found out in the process that just the analytical tools to do that kind of work are state of the art and will continue to be. And I want to kind of emphasize that this work is a snapshot in time, June 2007 is how we will look at it. And that there is a need to continue working on it as we found from our comments in the previous workshop on March 2. In fact the Commission and the Air Resources Board are committing to put additional effort into that type of work.

This report also hinges on how do you estimate those goals. Well, a lot of it is, what is the market penetration expected for each single fuel and technology. And that's how we approached this. We did our analysis as if, as if these were ten or more independent, parallel tracks where we try to describe what are the conditions needed to maximize market penetration for any fuel or technology.

Knowing full well that there is going to be a lot of competition in the marketplace. We are not trying to describe that competition near-term, mid-term or long-term, we're just going to try to point out where we think it might occur. Using your recommendations and analytical work we've done here, try to influence what kind of things need to happen in terms of government intervention and let the marketplace play out who competes, who competes well.

This report also asked us to look at certain milestone years, 2012, 2017, 2022. And then the Energy Commission and Air Resources Board decided that to get a better picture for a whole range of options we needed to expand this to 2030 and 2050. We have better detail up to 2020 and less detail from 2020 on and you'll see it in the presentations how that's reflected.

This is a list of the technologies and

fuels we considered. I think as we continue this kind of analytical work every year, every couple of years, that there are going to be other options added on to this as things mature and as new fuels and technologies emerge.

This is the range of what we're going to cover here today in our workshop. Some of these things are, some of these fuels are in the marketplace now in a semi-mature way, some of them are down the road.

The plan, the legislation also required us to do some other things. Economic analysis. And I'm kind of paraphrasing out of the legislation here on this slide. Three different kinds of economic analyses, one specific to evaluating the environmental and public health benefits of the options in a cost-effect manner.

And then two, one specific economic analysis on how to stimulate in-state fuel production. We feel that is likely to be primarily biofuels but we're looking for other comments and suggestions if you have any.

And then there's this kind of broad macro with this plan, a mix of fuels and technologies to lessen the impact on the state economy.

And then of course we are looking for recommendations in the form of what government intervention might be needed in the form of either economic incentives, programs, standards, mandates, other things.

And of course this report, as mentioned, is due to our Governor at the end of June 2007.

Some of the -- I'm going to just quickly list some of the kind of ingredients of the report and in the plan we expect to see after this workshop, developed after this workshop. Today you have pieces and parts of all this in a forum that we're trying to use to get comments. So not in one single report but several different documents.

A key part of this is the scenario report where we are describing at least three scenarios of business-as-usual, a moderate growth case and an aggressive growth case for the alternative fuels.

And for those milestone years that I mentioned, included into each of these scenarios are some of the things like in-state fuel production. We also, using these pocket penetration scenarios, identify what we will estimate the greenhouse gas emission reduction impacts and the petroleum reduction potential with the various market penetration.

We also identified certain market niches we think are high priorities. The report, this plan will also have recommended actions.

The legislation asked us to look at consumer acceptance. We have a fleet managers report that has some interesting results. There's a presentation later today on that.

The full-fuel cycle analysis report covers an update of the March 2 analysis and that series of reports that were put out. That full-fuel cycle analysis will also be attached to, in logic standpoint, to the low-carbon fuel standard analysis that the UC Davis/UC Berkeley people have put together and submitted to us. I think that's on our website right now, and there will be a compliance schedule added to that.

That's part of the Governor's executive order requirement to insert that into AB 1007. We consider the low-carbon fuel standard one of several actions that could be taken to implement the petroleum reduction goals and increase alternative fuels to the marketplace.

Then of course the economic analysis will be part of that plan and then the final report summarizing all this material.

Just a quick schedule. This workshop today is actually the third workshop we've had. We had an initial one on October 16. May 2 was focused entirely on the full-fuel cycle. And then today kind of a compiling of all of the scenarios and some of the other material. And we'll go through this just briefly.

We're looking -- This is a quick turnaround, apologize for the compacted schedule that we're facing but we're looking for comments on June 8. By that date. We are open to meeting with you too. In conversations we've had, a lot of ongoing meetings leading up to this we've struggled with that after this workshop.

And then of course we're looking a proposed CEC adoption on June 27 and a CARB adoption in late July. I couldn't remember the actual date of your meeting, I think it's July 26. July 26 is the estimated date.

In Mike Jackson's presentation coming up here in a few minutes he is going to go through some of the scenario assumptions but I want to kind of give you a list here of the types of things that we were looking at and gathering information on for this, kind of helping us define the scenarios.

And you can see there's a lot of -- We tried to quantify as much as possible in terms of market penetration. Market penetration occurs in a number of ways, primarily fuel consumption or for energy source/resource use if it's electricity. And then what that translates to in terms of vehicles, new vehicles. And a need for infrastructure to address those vehicles if there is a need.

We cover market niches. We raise several barriers. A key part of this whole process is gathering information on the capital costs basically cradle to grave, the supply, the vehicles. And the engine part of the screen, the infrastructure and then the cost to the consumer. You'll see that in a lot of the presentations.

I'm not going to go through all of these things because I think Mike will expand on this in his presentation. And that's where we are in this introduction.

I'd just like to just describe on the workshop agenda. This morning we have several presentations and panels so it's going to be -- we hope it will be a fairly interactive type of thing, presentations, panel members to make their comments, critiques, agreeing with whatever they hear or disagreeing. And all of the presenters on the panel, the members will be open to questions from the Commissioners and the Chair from CARB and the audience here.

In the afternoon it will be presentations in a more lecture style but still public comment through each one of these.

And I think that I'd like to emphasize this afternoon we've got a panel, the fuel cycle analysis update and the low-carbon fuel standard. Dan Sperling will be here to present the findings of where we are in that.

And I think that's where I'd like to end and introduce our next speaker who is Mike Scheible, Deputy Director of the Air Resources -- Deputy Executive Director of the Air Resources Board. He's going to go through a kind of overview of the scenarios.

PRESIDING COMMISSIONER BOYD: Tim and

Mike, while Mike is setting up his stuff let me make one comment. In your slide on the alternative fuels technologies included in the analysis there is a line that says biodiesel. And I just wanted to point out to the audience that we've gotten a little careless here on occasion of lumping biodiesel and renewable diesel together as one subject but we do recognize that they are separable issues.

If you look at the detailed agenda they will be addressed as separate issues later on in the day. And I know that's what Tim meant. I also know Tim was up probably all night getting ready for this.

MR. SCHEIBLE: Good morning. I'm Mike Scheible, Deputy Executive Officer of the Air Resources Board.

Last summer when we started to meet with the Energy Commission we decided this was going to be very much a joint effort between the Commission and the ARB staff and the Board. We had enough to do. We didn't have a low-carbon fuel standard, we didn't have an AB 32 global warming bill, and we thought that just looking ahead to 2022 as was required in AB 1007 didn't quite take us far enough. We needed to look further into the future and give them that extra time in the report. We convinced the Commission, I think fairly quickly, that that made a lot of sense.

So I am going to take you through just eight slides that have much less detail about what we've done in terms of looking towards 2050 and trying to meld the goals of the Energy Commission related to energy and the goals of the Air Resources Board and Cal-EPA related to environmental improvement. And give us a perspective so that when we do what's required under AB 1007 to look at 2017 and 2022 we have a longer term perspective.

So as I said, AB 1007 just requires forecasts to 2022. That's kind of mundane, it's 15 years out. We have great certainty over what is going to happen then so we thought we'd go to 2050. And the reasons why we did this are various. We wanted to help identify the ultimate goals for new fuels and different fuels and the roles of the various alternatives and the fuel we're currently using.

We wanted to allow times to reflect fleet turnover and technology innovations. By

2022 you can't turn a fleet over. Technologies may be available that's going to take a lot longer to get them in use and get the benefits of them.

We thought there was a need to have a longer target out there so that it would drive investment choices. Some things you wouldn't do just to get to a certain point in 2022 you would do with a longer goal in mind.

We thought it was very important, and this is a different goal, that we look at how the transportation sector might meet an 80 percent greenhouse gas reduction goal in 2050. And that became a driver of our analysis in terms of a target we were trying to meet.

And then lastly we needed to make sure that whatever alternative fuel paths were being done to get them to 2022 put us on the right course and moved us in the right direction for the longer term.

So we put a number of policy goals included in the efforts to create a 2050 vision. The only one that is really different from those that are covered under AB 1007 was this one, reduce GHG emissions by 80 percent. And I am going to touch on that a number of times becomes it becomes very important.

We wanted to create sustainable, long-term transportation fuels, protect the economy from dependence on a single fuel. Minimize costs through efficiency and diversity. So we think in the longer term efficiency plays a much greater role and diversity plays a greater role. And maximize potential for in-state production. If we're going to spend a lot of money on fuels we might as well spend as much of that as possible on something that gets recycled first in the state, either through biofuel production, electricity production, whatever.

As time went on in this effort AB 32 was passed and the low-carbon fuel standard came about so we had some additional things that we wanted to consider in this effort. AB 32 requires us to return to 1990 levels by 2020, but that's just the beginning as you'll see on the next slide. And that's about a 15 percent reduction in greenhouse gas emissions from today's level.

And whatever -- Since transportation is 40 percent of emissions, whatever the overall goal is, I think we have to do at least that well in transportation or we're not going to make it.

Then the Governor, even before the passage of AB 32, set greenhouse gas emission reduction goals to 20 percent of 1990 levels. That's an 80 percent reduction. And even though that was a policy choice it's very consistent with what the atmospheric scientists tell us. If the developed world doesn't figure out a way to run our societies with this kind of much lower carbon emissions then we're not going to be able to stabilize temperatures around the earth.

And we have to have some room for the four billion people that live in the developing world to come up closer to our standards, so we have to greatly reduce our emission-producing activities. That doesn't mean we can't drive, we can't be mobile, we've just got to figure out a way to use technology and I think some lifestyle changes to achieve that.

So that's an 85 percent greenhouse gas reduction from today's level. The good news, it's in 2050 so we have a lot more tools. Then we have the low-carbon fuel standard. The Governor in establishing that and launching that told us that we need at least a ten percent reduction in greenhouse gas emissions by 2020. But I'm assuming that further improvements, significant further improvements need to be done in the long term.

And lastly, it's that goal we need to ensure that long term greenhouse gas reductions are obtained from the transportation sector.

So graphically, here is the one graph I'll show you and here is the problem that we face. This is a graph that we used in the AB 32 process that shows how emissions are growing from 1990 through 2020 and what the goal of AB 32 is, which is about a 170-some million metric tons of CO2 equivalent reduction in the year 2020 over business-as-usual.

By 2050 we've got to go a little bit further. Obviously we're going to have to do a lot more. And I think what's really important is wherever we go and whatever we plan to get us to 2020 puts us on the course and starts us down the road to reach the 2050 goal.

So what did we do and what did we assume. First we've added two forecast years as Tim has said. A mid-term year of 2030 and a longer term year of 2050. These are not detailed forecasts. They use aggressive yet plausible, at least in my mind and those people we bounced off of, assumptions on technologies and fuels.

But we don't have the level of detail and it's not a policy commitment that all these things are going to be done. We really wanted to say what could be done and could the goals that I talked about previously be achieved. Do they seem achievable if the things that we think are plausible come about.

We reflect three broad strategies in the approach for transportation. The number one strategy and the most important one is maximize energy efficiency of both vehicles and fuel. We have to vastly improve the -- vastly reduce the amount of energy that it takes to move people around. Second, we need to reduce travel demand through technology and land use. That's better urban planning, that's substituting video-conferencing for flying around. That's a whole lot of other things put together.

There's not very much detail about these, either of the first two topics in the report. It simply says, these are the types of things that need to happen and then make some assumptions about what seems to be technically possible given that we have about a 25 year lead time to get the technology in place and another 10 to 15 years to turn the fleet over to do the other kinds of things to get the full benefits of the technology.

Lastly is something that is very much in 1007, which is to deploy a lower and lower greenhouse gas emitting set of transportation fuels. And the target that drove much of the analysis and the forecast was making sure that in the end there was an 80 percent reduction in greenhouse gas emissions.

So what are the results? Results meaning, what does the spreadsheet show. It's not a result in terms of what we know we can do. Well, the scenario that we modeled would have a tripling of average vehicle fuel efficiency. Real world fuel efficiency. And that meant the following:

That conventional vehicles on gasoline or diesel or whatever, not hybrids, average fleetwide 40 miles per gallon by 2050. Hybrid vehicles achieved almost 60 miles. It says miles per hour but that's miles per gallon. Sorry about the -- I did the slides last night and there's a few mistakes in here.

Electric drives have greater efficiency in terms of converting the energy delivered to the vehicle to turning the wheels and moving people around exceeded 100 miles per gallon and fuel cell vehicles exceeded 80 miles per gallon. Again, there is a mix of vehicles in there that on net mean that the average energy efficiency of the fleet is about 70 miles per gallon on an energy gasoline gallon equivalent.

Second, we had a highly diverse supply of transportation fuel. Seventy percent of the energy going to the vehicles came from low greenhouse gas biofuels or electricity or hydrogen. So that means that we have figured out ways of producing biofuels with small energy inputs and small emissions of greenhouse gases or we have done the same in the electricity sector and we have managed to figure out how to produce hydrogen in that way.

And lastly, we put in -- And we couldn't do 85 percent or 80 percent without this. We assumed the population increased to 55 million. We don't know what it is going to be in 2050 but that seems to be a middle range. But that driving was decreased by about five percent per capita.

We're still doing a lot of driving. That takes us back to 1990 levels. But if we continue the past trends, which is every decade we seem to on a per capital basis drive between three and five percent more because we're more affluent, we're going to have a hard time getting there even with very efficient vehicles and even with very low GHG.

What are the results in terms of when you look at changes from a business-as-usual forecast or a no intervention forecast, one we may have made a couple of years ago. Well miles traveled in the state for personal transportation decreased from 570 billion to 450 billion. That's an increase over the current amount of driving but in the forecast year it is a significant decrease. Per capital VMT decreased by about 20 percent from 10,000 miles per year to 8,000 miles per year.

The average fuel efficiency of the vehicle increased from 26 miles per gallon to 70 miles per gallon. That was critical. If you don't do that you're going to have lots of problems trying to figure out how to get such a large emission reduction and how to get the kind of different fuels for that.

Transportation energy demand decreased from 23 billion gallons of gasoline equivalent a year to something more than 6.4. We're driving less, we're driving in far more efficient vehicles. And the greenhouse gas emissions from personal travel decreased by almost 85 percent. That's 160 million metric tons per year over the project levels.

In the mix of transportation fuels used for personal travel, we didn't model the goods movement sector, was 30 percent from gasoline, diesel, natural gas or LPG. I kind of lumped those into a category of fuels that when the vehicle, when you drive the vehicle carbon is emitted from the vehicle. And the carbon that is emitted from the vehicle came from carbon that was originally stored under the ground in a petroleum or natural gas resource.

Thirty percent came from biofuels or other renewable liquid fuels. Basically when you use those fuels, again, you get carbon emissions from the vehicles but the carbon in the fuel came out of the atmosphere by and large. A large portion of it did and therefore you're not really adding new carbon to the atmosphere.

And 40 percent came from electricity of hydrogen. I kind of mixed those two together, that way you didn't have to figure out what was the mix of battery vehicles, plug-in vehicles or hydrogen fuel cells.

So that's a quick summary of the analysis. I don't know -- Is the write-up, it's a six page write-up, out there outside? I think it was posted last night. And it will become part of the report and give us a perspective for the main parts of the report in the work. And I don't know whether you want to ask any questions or how you want to proceed with the presentation.

PRESIDING COMMISSIONER BOYD: Thank you, Mike.

MR. SCHEIBLE: I'm here and available to do either.

PRESIDING COMMISSIONER BOYD: Thank you, Mike. Let me ask if anyone up here has questions for Mike.

ARB CHAIRMAN SAWYER: No. Just thank you, Mike.

PRESIDING COMMISSIONER BOYD: Mike, I was just -- Oh, Commissioner Byron.

ASSOCIATE MEMBER BYRON: Well I was just going to comment we certainly need to give Mr. Scheible a lot of credit for leading the charge on this one. Mr. Chairman, I hope that we're going to delay Mr. Scheible's retirement until this is accomplished, or until the year 2050, whichever comes first.

(Laughter.)

MR. SCHEIBLE: I chose 2050 because it is going to be very hard to absolutely prove me wrong. At least to tell me to my face.

ASSOCIATE MEMBER BYRON: Thanks Mike.

PRESIDING COMMISSIONER BOYD: Thank you, Mike. A couple of points you made that -- Well one, I remember that meeting long ago when we debated going out this far and how visionary of those who strongly recommended that we do that in terms of the events that have taken place since that time.

You noted, you had in your slides the reference to the need for greater 40 mile per gallon fuel economy for conventional vehicles. Which took me back to our great debates over the 2076 report and the desperate plea and call in 2003 for the need to achieve that kind of vehicle efficiency to sustain and survive. And we have not done a very good job of getting there so again the point has to be made. And I am glad you made the point that efficiency is job one.

And the point you made about reducing VMT, which gets into a lot of factors including land use and transportation planning integration. Which was called out in 2076, was referenced in the 2003 IEPR which was heavily referenced in the 2005 IEPR and it's kind of the one leg of the energy stool that is also part of the air quality stool that has been most neglected.

And I am very happy that Chairman Pfannenstiel and Commissioner Geesman have made this a major focal point of the 2007 Integrated Energy Policy Report they're making right now. Because we have got to work on reducing VMT to come to grips with our demand versus supply of transportation fuel problems as well as our criteria emissions and global climate change emissions. So I am certainly glad to see that it's part of the vision for the future. I hope those that succeed you and I when we do finally get to retire can carry that out. Thank you for your presentation.

MR. SCHEIBLE: Thank you, Jim.

MR. OLSON: Next on our agenda is Mike Jackson who will give an overview of the scenario, kind of the methodology, the process we went through and the assumptions. So Mike Jackson.

MR. JACKSON: Thank you, Tim. What I wanted to do is to spend a couple of minutes putting into perspective a little bit of what our job was when we started this out. And by our I mean TIAX staff as well as CEC staff. We both have put in many long hours on this process.

But to put it into perspective, the starting point of our analysis was really the 2005 Integrated Energy Policy Report, the '05 IEPR. In that process, and even in the process coming up to the 2005 IEPR there were a number of stakeholder groups that were held for the various technologies, natural gas, propane, biodiesel, ethanol, biofuels, ethanol, hydrogen, electric drive technologies, alternative diesel fuels and formulations, and many others.

We also tried to incorporate all that knowledge and understanding in the efforts that we went forward with but also to look at what the energy demand projections were that came out of the 2005 IEPR.

And the objective analysis to determine the possible alternative fuel penetration scenarios was to determine those scenarios and then to estimate where we could gasoline displaced, greenhouse gas emission reductions, implementation costs.

A pretty broad range of what we were talking about in terms of costs is research and development, product developments costs, the vehicle costs, infrastructure costs. So it's kind of trying to capture all that. And then identify what the barriers possibly are and what you would need to overcome those barriers, either in terms of needed incentives or regulations.

And as Tim mentioned we really attempted to look specifically at supply, that is the fuel supply. Product availability, not only in terms of vehicles but engines, what the infrastructure was and what the costs and the consumer response might be for each one of these fuels.

As part of that we reconnected with various stakeholder groups for each of the major fuels for input and had private meetings with individual stakeholders where we could to further explore really the business case for each one of the various fuels and technologies. And let me emphasize that again, the business case. Because if it isn't sustainable it is not going to be in the marketplace. So we really wanted to understand what would make these fuels and technologies sustainable in the marketplace.

And then TIAX and CEC staff performed analyses based on the stakeholder input in the recently published reports to put that together.

Now let me just talk a little bit about technologies and implementing and sort of what are the characteristics of new technology introductions. This was -- I got this from a California Hydrogen blueprint. I see I've still got California Hydrogen on there but don't worry about that.

The point is that for technology, be it a vehicle, be it anything else, you generally have a low level of introduction into the marketplace and then there becomes a launch point where the consumer acceptance happens and then you start to get rapid introduction into the marketplace.

You could take this and draw, for example, the electric hybrid vehicle on here. The development time to the launch point for HEVs in California, or the US for that matter, is about seven years before this took off. Right now US-wide I think HEV sales are 2.3 percent of new car sales. It's getting to be a big number.

So there's a couple of things that you look for in trying to figure out what's going to happen in terms of these penetrations. One is the launch point, the other is how fast. What is the rate that the technology will come into the marketplace or the rate of acceptance. And there are things that, of course, that these two points or these two characteristics are functions of.

For example, the launch point. The technology has to be there, it has to be at a cost where the consumer wants it. It's got to be in the showrooms, for example, if it's a vehicle. It's got to have performance, style, range. It's got to have the right color. It's got to have all those things in order for consumers to take it. And it's also, in the case of alternative fuels, you better have the fueling structure there if you're going to fuel it.

The rate of acceptance is probably a function of a lot of these things too. But maybe vehicle incentives would be a part of that or regulations would be a forcing function. So this was sort of a background for each one of the teams that was working on the various technologies. Where are you in terms -- Where are we in terms of a business-as-usual case and where are we or where could we be if you assume different penetration. And if you make an assumption on the penetration what are the conditions that are going to get you to achieve those assumptions on penetration.

Now I thought I would throw up a couple of other slides here and these are from a GM presentation. But when we go through this today we're talking only about single fuels. It's an entire system here, right. On the left hand side here are the energy resources. And if you drew this today, weighting it on the amount of energy of course, everything below the conventional oil would be very, very small. It would be hardly observable here.

The idea is how do we bring in these other energy resources into the transportation market and increase energy diversity into that market. And there's various ways, right? If you look at the conversion processes, for example, you can take something like biomass and produce ethanol. Put the ethanol and blend it in with existing fuels and you could use conventional vehicles.

Another approach would be to take the biomass and gasify it to CO and hydrogen and take that to the hydrogen pathway. So there's interconnections here even though that when we talk about the various fuels this afternoon they're kind of separate.

And on the right hand side what you see is just a number of propulsion systems starting out with the conventional internal combustion engine, be it gasoline or diesel, and then working its way down to, you'll see, more in terms of what the electric platforms are going to be in the future. And to a certain extent you're moving down in terms of overall vehicle efficiency when you go down that path.

Shown separately, again taken from GM, if you had the objective of improving vehicle fuel economy and emissions on the Y axis and your energy fuel diversification on the X axis. Today we're down in the left hand corner here of IC engines, transmission improvements. We are making incremental improvements, not only on emissions but on fuel economy.

But as you move in the out years, as you move in the out years you're going to see more and more of the electric drive technologies. This is at least GM's vision and I tend to agree with it. You're going to see more and more of the electric drive technologies either in the hybrid, the plug-in hybrid or batteries or hydrogen fuel cells coming on.

But the point here again is that there is a time scale to this. Not all of these technologies are on the same time scale, right. So there's things that we can do today and there's things that are going to have to wait until the technology evolves tomorrow. So I'd like you to keep that in mind when we walk through these technologies. Thank you.

MR. OLSON: Very good. Thank you, Mike. And don't go away because you're going to do the next presentation too.

We're going to go into each of the fuel technology sections right now starting with the electric drive train. And what I'd like to do is have the industry, the panel members to come up to the table wherever you're interested in sitting. That would be Dave Modisette from Cal-ETC and Analisa Bevan from the Air Resources Board. There might be others on the phone.

Actually before we go into the next presentation we wanted to get any comment at this point on what you've heard today. Comment on this front end, the overview and any of the future vision. Any comment in the room here? Anybody want to make a comment? Or on the phone.

We have one person on the phone.

Hello, anybody on the phone? Maybe not.

PRESIDING COMMISSIONER BOYD: While you're waiting for the person on the phone I will just comment on Mike's use of General Motors' slides. It's enjoyable to commend General Motors for their great visions, now let's see about the delivery.

MR. JACKSON: I won't speak to that.

MR. OLSON: Okay, I guess we don't have -- Okay. No comment? Okay.

Then Mike, I'd like you to then go into the electric drive section starting the first part of the scenarios. Thank you.

MR. JACKSON: Okay Tim, and see if you

can keep me on schedule here too because this one is a fairly long presentation.

What we attempted to do here was to look at electric drive technologies and how they would play into the context of AB 1007 in terms of reducing petroleum use in the state and decreasing greenhouse gas emissions. And this work was done by myself, Matt Hooks who is in the audience, and Dan Rutherford who is not here today. Mostly TIAX. And a lot of this work was done previously in a study that was, two studies that were sponsored by California Electric Transportation Coalition, Cal-ETC.

So as you can see I've got a lot of things I want to go through and I'm going to have to go through some of this stuff really quickly or smartly. I want to talk a little bit about the methodology and do an overall impact kind of summing things up but there's basically five different technologies that I wanted to look at in terms of electric drive technologies.

Cold-ironing. This is also known as alternative marine power, AMP. Primarily aimed at the ports, primarily aimed at ships coming in and hoteling at dockside. Truck stop electrification.

Sort of the same concept except for a truck now. Transportation refrigeration units which are used to move perishable goods throughout our state. Electric forklifts. You all know those, they're the kind that are used internally to lift up and down goods in stores. All those are really off-road applications. And then I want to touch upon plug-in hybrids, which would be an on-road application and end with conclusions.

Okay. The goal here really was to estimate and compare the cost-effectiveness of these five different promising e-drive technologies. I already said it, I said what they are, they're shown there. We did calculate cost-effectiveness by considering not only criteria pollutants and greenhouse gas emissions but also drawing dependency benefits. And I'll discuss as much as I can on this technology. It deserves a presentation in itself.

The economic data for this analysis was gathered from a wide variety of existing studies combined with direct contact with manufacturers. The emissions were updated based from our Phase 1 study of Cal-ETC based on appropriate ARB and EPA rules, which had changed since we had the study several years ago. For example, the marine gas oil requirement or anti-idling restrictions on trucks. All have been put into regulations by ARB.

We did cost-effectiveness estimates for two scenarios, what we called expected, that is things that are on the books, regulations, then secondly achievable. Meaning more of an aggressive case that you could, that you could do. The three years that we looked at were 2010, 2015 and 2020, which is slightly different than the AB 1007 years of 2012, 2017 and 2022 or 23, 22, and 2030 and 2050.

And then we had two cases, sort of a low and a high in terms of cost-effectiveness to kind of bound the situation. We looked at two different cost-effectiveness metrics, Moyer, which as most of you know really focuses on up-front costs normalized by NOx, ROG and a 20 times factor times PM. And then finally what we call a benefit cost ratio, which really monetizes the private benefit divided by the annualized capital cost.

You'll sort of see -- I'm going to do a couple of those so you can see the difference between these two methodologies. We're leaning more towards the benefit cost ratios as opposed to the Moyer cost-effectiveness.

This shows the GHG reductions in tons of CO2 equivalent for these five technologies in terms of the business-as-usual, the moderate and an aggressive case here. And then scenario years. Again, it's tons so it's total tons per year. I don't have much to say other than it increases as you go with time.

We'll get a little bit -- AB 32 requires 1990 GHG emission levels by 2020, necessitating a reduction of 175 tons of CO2 by 2020. There must be an error in our units here. Is this millions of tons?

MR. HOOKS (FROM AUDIENCE): Millions of tons.

MR. JACKSON: Huh?

MR. HOOKS (FROM AUDIENCE): Millions of tons.

MR. JACKSON: Millions of tons, thank you. One-hundred seventy-five seemed a little low.

Petroleum reduction associated with these adoptions. You can see again that you're going -- Now this is millions of gallons so the thousand here would be a billion gallons. So these technologies can get you roughly a billion gallons of gasoline equivalent displacement in the aggressive scenarios in the out years. And most of that is attributed to two segments, e-forklifts and the plug-in hybrids.

So let's go through these pretty quickly. Cold-ironing allows oceangoing vessels to reduce emissions by operating on grid power while in port and avoiding the operation of diesel, shipboard diesel engines. This can offer significant criteria pollutant reductions since you're offsetting the significant diesel loads in close proximity to your densely populated areas, also an important point. It could be adopted to a range of different vessels including container ships, tankers and refrigerated cargo ships but also could be worked on for passenger vessels.

The primary barrier to implementation is the need to retrofit existing vessels to operate on the relatively high power requirements. And secondly the shoreside investments that you have to put into this. These ships generally have long lifetimes and fall out of the traditional local and national regulatory authority so it's hard to convince these guys necessarily to make that conversion.

The ship retrofits are, you know, you're probably talking about $1.5 million. The fact that it is a long lifetime might be helpful in the sense that you could amortize that, at least amortize that investment over a longer period. The berth retrofits are fairly expensive and really depend on the type of power that has to be provided but in a range of three to eight million dollars per berth. In a port, a typical port, there's many of those.

Here's an example in terms of tons per year. Again is this tons per year or is this millions of tons?

MR. HOOKS (FROM AUDIENCE): Tons per day.

MR. JACKSON: Tons per day, okay. This is an example of the criteria emission pollutants reductions that you could get from these. These are not necessarily small when you think of them in a port. NOx, for example, anywhere from 2.5 to 5 tons per day. That's a pretty big reduction in a very small area. PM also fairly substantial in a small area. So these are reductions that at least in the out years if you look out here for NOx in the 2020 time frame, that's a fairly substantial number in and around the ports.

I think you are all familiar with the good movements plan in California or the south coast inventory. The ports have become an aggregate. The ports have become one of the biggest emission sources in the South Coast Air Basin so things like this would go a long way in helping clean up those areas.

In terms of greenhouse gas emission reductions. These numbers also are fairly large. It's just putting it in context. These are tons, not tons per day. Pavley -- Well, I can't do that math in my head so I won't do it. But on the order of 300,000 would be 1,000 tons per day I guess. The petroleum reduction in terms of million gallons of GGE are on the order on the high side about 130 million gallons just from this one concentrated scenario.

What I'm showing you here is annualized life cycle and societal benefit costs for cold-ironing. And what you see here is it's separated in terms of operational savings or operational costs and societal benefit. And then everything above one in this particular metric is a positive or a net benefit.

And take 2010 for example. What that's showing is that the societal benefits are actually close to $4 for your up-front costs or your up-front investment. So the benefit is four times the up-front cost but you have to reduce that because in this particular case you have an operational cost, i.e. the electricity may be more expensive or the technology is more expensive in that year. Or you're not quite getting full utilization of the investment that you made so it reduces the amount of the benefit relative to up-front cost.

The bottom line is that all throughout this, whether unexpected or the achievable, you have roughly, you have a leveraged effect where you're getting -- your benefits far exceed or at least a number of times exceed the up-front cost of the technology.

You could also look at this on Moyer cost-effectiveness and not surprising you see similar, you see similar type numbers that indicate that the up-front cost relative to the emission benefit is favorable. Moyer typically we're talking on the order of $14,000 a ton combined relative to ROG plus NOx plus some part of PM. So some of these technologies are a little better than others but the net result is that either way you look at this it is a reasonable investment to get the benefits that you want.

Some of the actions that are required for cold-ironing to actually happen to get into the market in the business-as-usual gross scenario, both the San Pedro Bay ports have outlined targets for voluntary adoption of cold-ironing in their action plan. Continued progress to get to those goals would be required.

The moderate growth scenario requires incentives to overcome the higher up-front costs, perhaps by incorporating a GHG or petroleum reduction from the Moyer.

And the aggressive growth scenario requires ARB adopting the most aggressive rule possible. Say requiring 80 reduction in hoteling emissions. And most likely an existence of and US participation in some sort of regulatory regime that is actually going to require reductions in GHG emissions.

Okay. I can see that if I go at that

pace it's going to take me all day here so I'm going to have to go a little bit faster.

Truck stop electrification aims at reducing emissions and fuel consumption associated with the main engine idling at truck stops. And there's really two types of technologies here. There is one that uses grid power to supply the on-board HVAC and then there's off-board truck stop electrification systems such as Idealaire that uses off-board HVAC providing heating and cooling and other services.

There is a rule here. EPA is sponsoring the Smart Way transportation programs that provide grants. Here's the types of reductions that you could possibly get on the criteria pollutant point of view. NOx again and PM are probably the primary things that you're going to get targeted out of this. And they're not small. Again they could be very large relative to the whole state of California.

GHG reductions in the hundreds of thousands of tons per year equivalent and petroleum in the 20 million to 50 million. It's not a huge number but, you know, for a small segment this is not bad.

And then the types of cost-effectiveness here. Again this is Moyer. Anything below 14,000 is good. These are in the 5,000 range. Should be fairly effective. And then our other approach of looking at benefits divided by the up-front costs. Again here you have substantial operating savings plus you have societal savings.

The issue here, and an issue with a lot of these electric technologies is there is a high, there is an up-front cost that has to be, the consumer has to take on even though the life cycle costs might be reasonable and saving money over the life of the particular application. But it's that up-front cost that is a barrier to people getting into these technologies.

And then again some actions required. You can read these, they're in the presentation. But there needs to be fairly good vigilance on making sure that the adoption of the diesel APUs in the trucks is happening. Some incentives may need to be put in place to overcome the high up-front costs as I just mentioned. And maybe you have to put together something like a feebate system to really capture, to help the consumer capture the full value of fuel savings.

Okay, truck stop, our transport refrigeration units, TRUs. The idea here again is that these can play a role in terms of getting off of the existing TRUs, the existing small diesel units which are fairly dirty. There's really three types of these TRUs, the diesel units with electric standby function that can only perform pull-down. Pull-down means how fast you can take the temperature of the container down to the needed temperature so that these perishable foods can exist. And there is a performance standard and it's like a half-hour or 30 minutes.

So some of these can only perform pull-down when operating in the diesel mode and not in the backup mode so the backup mode is used just to maintain the temperature. There's electrically driven ocean containers that are powered by ship power or diesel generator sets when on land and then there's hybrid diesel electrics that have full electric pull-down capability and provide significant maintenance cost reductions.

Limited operational hours degrade to a certain extent the life cycle economics of these types of applications. TRU adoption works best at centralized areas where you have fleet-based warehouses where a single owner is responsible for both electricity and the diesel purchases.

Types of criteria pollutant reductions here on NOx we're probably down to somewhere in the one ton per day type. And much, much smaller of course in terms of GHG emissions and also in terms of petroleum displacement. But like air quality you're going to need every little bit in order to accomplish major reductions of fuel use, energy use in California. So this is a step in that direction.

Cost-effectiveness. In some cases depending on the application, whether it's on a semi-truck or it's a bobtail truck, you see that we're pushing up on the Moyer cost-effectiveness. Again that is hurt a little bit by the duty cycles that are used with these particular units. And that could be looked at and it could be changed potentially.

And again from the annualized benefit to up-front cost. We still see a benefit, there still is operational savings that are shown here but not nearly as large as some of the benefits that we have seen in some of the other applications.

Again sort of the same kind of messages here. Feebates, help the consumer overcome the first cost kind of issues. Electric forklifts. These already enjoy a fairly large market share but technology improvements can and will expand the potential uses and penetration of e-forklifts.

Widely adopted indoor applications as they reduce fuel use, maintenance costs and allow narrow aisle operation. Technology advancements, especially in batteries, AC drive systems and fast charging will, we believe, drive the expansion of these applications. Many of these advancements will allow for replacement and downsizing of some of the heavy-duty forklifts with electric forklifts also.

The technologies analyzed, e-forklifts have the largest private benefit despite significant incremental costs, which I'll show you in a minute. In all the cases e-forklifts provide a large fraction of the overall benefits for both GHG and petroleum reduction. And here you see the criteria pollutants. Now we're talking on the order of three tons of NOx, three tons per days of NOx. NMOG can get up fairly high. And there are some benefits of particulate also.

GHG reductions in the expected case similar to some of the other technologies but in the achievable case a fairly large increase in terms of tons of $CO_2$. And again, for relatively small units, so to speak, the petroleum reduction can get up into the 200 million gallons per year.

Cost-effectiveness on the Moyer side, not surprising is very high because Moyer does not account for fuel savings. This is one of the problems of the Moyer cost-effectiveness.

If you look at it from a dollar benefits to up-front costs it's much, much better. And here you can see that for these applications it really is the operational savings associated with these applications that drives the benefit to up front cost ratio.

And here very important again is the fact that the electric applications cost more up-front and therefore the consumer has a hard time figuring out how to do the life cycle costs in order to justify the higher up-front costs. There's a lot of ways that you might be able to incentivize that or have part of that up-front cost covered by yet another entity and sort of level out the cost for the consumer.

Plug-in hybrids. Okay, now we're moving from off-road to on-road. Here because of the large number of vehicles you could potentially talk about PHEVs have the ability to significantly reduce transportation sector petroleum use with little infrastructure investment. And that's something that, you know, as we go through the afternoon think about the infrastructure investment relative to other alternative fuels.

They can operate on electricity and gasoline allowing for home charging without the range limitation of all-electric vehicles.

A major barrier at this point is performance and cost of batteries, although lithium ion are being developed today that have a lot of promise. As we have seen in ARB's recent ZEV review there are still lots of questions that have to be answered on cost, durability, et cetera.

PHEVs also may be very suitable not only for light duties but for the heavy duty market as life cycle costs tend to be more favorable for that segment of the market. And as most of you know almost every day now there is one article here or there about PHEVs and what policy makers are thinking, what environmental groups are thinking, what the OEMs are thinking about bringing out and using PHEVs, either from a policy perspective to reduce GHG emissions or from the perspective to give the consumer added value.

Here the emissions for criterial pollutants are not nearly as large as you saw in some of the off-road applications. Mainly because the vehicle fleet itself and the gasoline technologies themselves are fairly clean in use.

So it would really be a GHG or a petroleum displacement strategy. And these numbers can get fairly big depending on the number of vehicles that go into the marketplace.

In this case in 2020 we were projecting somewhere on the order of one billion gallons of petroleum displacement. And this penetration is very similar to the penetration that hydroelectric vehicles have achieved in California.

And then not surprising, on a Moyer cost-effectiveness, because the criteria pollutants are fairly marginal, there's a fairly marginal improvement compared to cleaner gasoline technologies, we see that the Moyer cost-effectiveness numbers are actually pretty high in this case. But on a benefit to cost input there are savings that the consumer is getting out of using fuel cost savings that the consumer is getting and that primarily drives the benefit.

Okay. There's a whole bunch of things that will have to happen for PHEVs to be brought into the transportation market and some of those are listed here like maintaining the alternative fuel tax credits and cost sharing that is in the 2005 EPAC regulations. There probably needs to be significant public investments continuing in the battery technology. Push for increased fuel economy will obviously push the OEs into doing that, into using these kind of technologies.

And then, you know, in the end sort of the aggressive growth, it's going to come down to the battery. The cost of the battery, the durability of the battery and how can it be packaged into the vehicle and how well that vehicle is accepted by the consumer.

Let me end here by saying that from our perspective there are a number of policies and incentives that will benefit all of these various electric drive technologies. Incorporating either on- or off-road e-drive technologies into

California's low-carbon fuel standard, for example, will help to push these technologies. The question is going to be of how you generate credits, either on the on-road or the off-road side and how that plays back into fuel providers.

Incorporating offsets into AB 32, since the transportation sector is often thought of as being low-lying fruit, that would be cheaper in terms of getting $CO_2$ emissions than say maybe some of the stationary side. All that then requires consideration.

Plus you're going to ask the utilities to go ahead and do this in terms of providing electricity or power to these PHEVs, which would have the net effect of reducing $CO_2$. You can't penalize them for generating electricity to do that so you've got to be a little bit careful.

So the existence of participation in a post-Kyoto International Regime for climate change or AB 32 requirements all would push these technologies. If you put this all together and say from a cost, from a benefit cost/up-front cost ratio how does this look, it's shown on this chart here.

And cold-ironing is the first one we

talked about. And again mostly cold-ironing is giving benefits on the societal basis. It's all that NOx, all that's PM that's happening out of those ships in and around the ports.

TRU, transport refrigeration units is sort of split between societal and operational costs. Truck stop electrification also split but look at how much of a benefit its getting. You're leveraging about 12 times your up-front costs.

E-forklifts, mostly a consumer life cycle savings and in plug-in hybrids the same thing. Whereas just shown for comparison is a diesel particulate filter on the right hand side where you would actually have an operational cost compared to the benefit you would get by removing particulate out of that.

I'm going to stop right there.

MR. OLSON: So we'd like to go to comments from the dais here then the panel we have at the table. And then after that anybody in the audience here or on the phone. If you want to make a comment on the phone you need to let the agent, make it known that you want to make a comment. So any comments from the dais?

PRESIDING COMMISSIONER BOYD: I'll hold

mine until the panel is done.

MR. OLSON: And the panel here.

MR. MODISETTE: Thank you, Commissioners and Dr. Sawyer, Dave Modisette with the California Electric Transportation Coalition. I guess first of all I would like to commend the Energy Commission and TIAX for the very, very detailed work that they have done on the electric drive technologies. You can probably tell that they spent a great deal of time looking at these five technologies. I just have a few technical comments on the analysis and then some policy recommendations.

I guess on the technical issues, you can see in table 5-4 they used a low price for conventional fuels, gasoline and diesel, and a high price. I guess I just wanted to point out that the high price for gasoline in 2010 is listed at $3.02. You know, we're all paying a lot more than that today so it would be our recommendation that that high price for gasoline and diesel be increased quite a bit more.

Secondly their mid-case scenario, which they call the cost-effective growth scenario. We actually don't like that particular label because

I think it leads you to conclude that the aggressive growth scenario is not cost-effective and that is not the case.

As you can see in table ES-1 there's consumer cost savings for all of these technologies with the exception of cold-ironing. So people are actually saving money by using these technologies in addition to the very large societal benefits that they provide. So the aggressive growth scenario is cost-effective as well. We would just suggest that maybe that mid-level case be relabeled moderate growth scenario or something like that.

We do believe that all the scenarios appear to be reasonable for the technologies that have been identified but we would like to see some additional results going on beyond 2022. We think this longer term vision, 2030, 2050, would show even greater benefits for these technologies.

Now I guess on the policy recommendation side I guess we would like the Commissioners to understand that this particular analysis did focus just on five electric drive technologies and we believe that that is appropriate because that's really where the large societal benefits are, at least in the near-term.

But we do want to note that there are quite a few other electric drive technologies which are in use today and which can provide even greater benefits in the future, including electric airport ground support equipment, industrial tow tractors, burden and personnel carriers, turf trucks, sweepers, scrubbers and burnishers, battery electric vehicles, city cars, neighborhood electric vehicles, electric busses, electric commuter rail and electric lawn and garden equipment.

You've heard me say before that electric transportation is simply not the silver bullet to our petroleum criteria pollutant and greenhouse gas problems but we think that they can be an important component and part of a broader strategy to solving all these things.

And the story line analysis really quantifies and verifies this. Electric drive technologies are an important part of the transportation fuels mixed today and they can even be a much larger one in the future.

As table ES-1 shows for most of these technologies consumers are actually saving money with these technologies. And this is a particular benefit of electricity. Electricity is cheaper than gasoline and diesel and so consumers can actually save money while at the same time providing very large societal benefits.

But there is a characteristic of electric drive technologies which is preventing their widespread commercialization in the marketplace and that is that they tend to have higher initial cost than conventional gasoline technology.

So this is not unlike energy efficiency technologies, which I know the Commission deals with every day. People are not buying compact fluorescent light bulbs even though they save money because they have a higher initial cost. And that's really the policy barrier that we have to overcome with these technologies.

The staff makes a number of recommendations in this area such as feebates, grants and loans and we agree with those. But there is another one that I think I would like to put on the table. It was actually recommended in the 2005 IEPR. And that is for the creation of a low-interest or no-interest loan program for these technologies, which would really help to deal with this high up-front cost.

Another variation on that might be a loan guarantee program. It turns out there is an existing loan guarantee program today in the California Pollution Control Financing Authority. It's called the Capital Access Program. And some air districts, in particular the South Coast Air Quality Management District, will actually assist people, assist consumers to use that loan guarantee program by buying down some of the interest rate. And if that is a program that we could expand and help consumers use that I think it would help. All of these technologies would have a higher initial cost.

A couple of other recommendations. With regard to plug-in hybrids we would like to see this report carry forward the recommendation that was made in the 2005 IEPR to create a plug-in hybrid working group or a coordinating council.

There is a great deal of activity now going on with plug-in hybrids but one of the problems is that there is very little coordination among the industry and public sector participants in this area.

So we would like to see some kind of a coordinating council created under the auspices of the state of California, either the Energy Commission or the ARB or both, which would provide that kind of coordinating function.

We would note that just last Friday at the ARB's zero emission vehicle review the Air Board directed the staff to look at the regulation, try to provide additional incentives for plug-in hybrids. So we're very, very hopeful that that staff recommendation that comes forward will provide sufficient incentives for manufacturers to actually introduce these vehicles into the market.

As Mike said, the low-carbon fuel standard could also be very, very helpful for electric technologies. That has yet to be developed but the University of California team is recommending that non-road vehicles such as the ones that were analyzed in this report be included in that as long as -- in addition to plug-in hybrids.

We would also recommend that the Energy Commission and the PUC reconsider the role of regulated utilities with regard to electric and natural gas fuels. This was actually a recommendation in the first Energy Action Plan and has carried forward today. We believe that that should be an issue investigated by both, both commissions as this moves forward.

Let me just kind of close by making one additional recommendation and that is that we really feel like there is a need for an additional policy tool here. We need some kind of new evaluation methodology for these technologies which takes into consideration all of their societal impacts, including greenhouse gas reduction, reduction in criteria pollutants, air toxics and other multimedia impacts, reduction in petroleum dependency. Of course life cycle costs and infrastructure costs.

You can see that some of the work that TIAX has done, they have approached this. We really think that this kind of comprehensive evaluation methodology is needed and should be employed by all of the agencies that have responsibilities both with air quality, greenhouse gas reduction and petroleum reduction.

Thank you very much.

MS. BEVAN: Thank you. I don't have a

whole lot to add. I didn't realize I was going to be sitting up --

THE REPORTER: Please state your name for the record, please.

MS. BEVAN: Analisa Bevan.

THE REPORTER: Thank you.

MS. BEVAN: I would echo Dave's appreciation for the work done by CEC and the contractors working on this effort. I have one technical comment or thing that I would like to see explored a little bit further and that is on the assumptions of what these plug-in hybrids will look like, especially in the early years. The assumption that a vast majority of them will be P-20s or plug-in hybrids with an all-electric range of 20 miles or thereabouts.

I have a suspicion that the plug-in hybrids that we see in the early years will be substantially less than that, more on the order of a P-10, and that that will build as the technology is -- that all-electric range will grow as the battery technology is proven out lifetime and durability and performance. So I think there may be a softer curve on the all-electric range there.

I would also echo that I agree the

scenarios that are looked at here for the five technologies that can have significant impact on the policies for alternative fuels are correct but also that there are many other sectors that will have an impact as Dave pointed out. Those are my comments right off the bat.

PRESIDING COMMISSIONER BOYD: Thanks to the panel. Do any of the folks up here have any questions of the panel?

One comment that's not really a question I want to put out here is just to point out that the CEC in all the work it did in preparing the transportation component of the 2005 IEPR got pretty deep into vehicle technologies and got pretty deep into plug-in hybrids. And as many of you know, made a very strong endorsement and recommendation in that document that we move in that direction, excuse me, and do all we can as an agency. And that at a time when it wasn't as popular as it has suddenly become today. The manufacturers hadn't stepped forward and a lot of folks had concerns.

So we have invested $3 million of research money in the establishment of the plug-in hybrid electric vehicle center at the University of California at Davis and have created a research advisory committee to advise that center, which had its first meeting just a little over a week ago.

I would like to encourage the ARB, who has been invited to join our advisory group -- I know you're struggling with the legalities of that question but I hope you can find a creative lawyer to allow you to participate in what is really just a research program advice and counsel. Because we feel pretty strongly that this indeed is an extremely positive way to address energy, air quality, greenhouse gas issues.

So with that again I would thank you for your comments. I always look forward to working with the two of you and others in this area.

Tim, did you want to see if there is any public comment?

MR. OLSON: Yes. Are there any public comments on electric drives? Yes sir. If you would step up to the microphone, give your name and affiliation.

MR. SWEENEY: My name is Mark Sweeney, I am a consultant who is working with the California Natural Gas Vehicle Coalition. I've got a quick question for Mike.

You show basically forecasts or projections of cost benefits in future years. Are there any underlying forecasts of fuel prices at say, truck stop electrification where you have a forecast in 2020 of electricity prices and diesel prices so that fuel cost differentials in that future year are reflected in your cost benefit measures for that year?

MR. JACKSON: Did we do that Matt? I can't remember.

MR. HOOKS: Yes. I don't have the --

MR. JACKSON: Come up here. The one thing that we did, that I remember at least of this, is that we made sure that we had the time of day rates charging correct in the study. So for example, if some of these technologies actually had to be charged during the day they were charged substantial amounts for that amount of electricity.

MR. SWEENEY: The current rate or the projected rate for 2020 say for cost benefits of 2020?

MR. JACKSON: I don't remember, Mark, to tell you the truth. Do you remember whether it was current, Matt?

MR. HOOKS: I believe that there were, I believe that there are --

THE REPORTER: Can you state your name for the record, please.

MR. HOOKS: Sure, this is Matt Hooks from TIAX. I am almost certain that there are electricity and diesel and gasoline fuel cost projections used in all of these analyses.

MR. SWEENEY: Is it going to be possible for the people who are interested in this subject to have a chance to look at those assumptions?

MR. JACKSON: Sure, absolutely.

MR. HOOKS: Yes.

MR. SWEENEY: Thank you.

MR. JACKSON: We'll provide them.

MR. OLSON: Okay, any other comment here? Yes sir.

MR. PRATT: Hi, Mitchell Pratt, I am a Senior Vice President with Clean Energy.

Mike, just another point of reference. I think on the cold-ironing that you did I only heard grid references, powering from grid. I don't know if you have considered the Whitmore Technologies which is the use of a natural gas generator for shoreside power. It's much more readily implementable and at what appears from our studies to be a very cost-effective approach.

MR. JACKSON: I think that's being used in the Port of Oakland, isn't it?

MR. PRATT: It is undergoing, well here in the next month or so it will undergo its proof of concept. It has been a patented process that's ready for implementation.

MR. JACKSON: Since you brought it up, there are other techniques too for reducing the emission impact of marine vessels in ports. There's competing technologies.

MR. OLSON: Any other comment in the room? Yes. State your name, please.

MS. MONAHAN: Patricia Monahan with the Union of Concerned Scientists. Mike, I want to thank you for analysis. Always interesting and always well-done.

And I want to reiterate a comment that Dave Modisette made about the fuel price. We would strongly urge the inclusion of a very high fuel price and have the baseline be the high fuel price. That was the 2005 IEPR standard and we think it would more fairly represent the range and costs that we might, the fuel costs that we might see.

And just one quick comment on table 5.2. I think it's mislabeled, it should be upstream and downstream emission factors.

MR. JACKSON: Okay.

MS. MONAHAN: And it needs the greenhouse gas -- the grams per unit fuel should be grams per energy equivalent. Diesel should be higher on a grams per gallon basis.

MR. JACKSON: Okay, we'll look at that, thank you.

MS. MONAHAN: Thank you.

PRESIDING COMMISSIONER BOYD: Thanks, Patricia. Our crystal ball on fuel costs has always been very cloudy the last several years.

MR. OLSON: Yes please.

MR. VAN AMBURG: Bill Van Amburg from Cal-Start. I'm actually wearing two hats here today, CalStart where I work, the advanced transportation technologies group, and also CALSTEP which is a project of CalStart, the California Secure Transportation Energy Partnership, which has just released an action plan on petroleum reduction and energy security.

I just wanted to give a tip of the hat to Mike Scheible. Because as you look at 2050, we came to the same scenario conclusions. It is a three-legged stool. And if we don't get VMT reduction and efficiencies we can do all we want in fuels -- we've got to do all three. And we think actually you might need to think about ten percent or more VMT reduction to really hit the targets.

But on the topic of electric transportation technologies. We're really interested in whether you looked at the gates or what enabling steps you needed to go through, particularly for plug-in. We operate, for instance, in the heavy-duty area, an effort on heavy hybrids.

And there are some real interesting plug-in heavy vehicles whereas particularly for shutting down engines at work sites a little more energy storage would be real valuable. But you've got to get through a gate of commercializing that core electric driveline, which is kind of a step you go through. What gates did you guys consider as you looked at light and heavy duty?

MR. JACKSON: In the light duty you can

see that there are electric drive technologies evolving even today with the, with the current HEVs that are on the market. And we see that progressing. But the battery is really -- to us the battery is the enabling technology. If we can't get the lithium ion batteries at the cost targets and we can't get them to get to the durability needed for those applications and we can't get the power density. All those things are really, really important. If that doesn't happen plug-ins don't happen.

MR. VAN AMBURG: Yeah, and I think I really agree with the soft launch or however you want to characterize that. I think there is going to be this squishiness to increase the business value with just smaller but steady incremental growth in the energy storage aboard passenger cars and potentially trucks. I think that's a different model that really should be looked at rather than it's going to be a jump step into all-electric range for 20 miles right away.

MR. JACKSON: And Bill, I don't know, and maybe you can shed some light on this, as to where -- I mean, DaimlerChrysler has looked at it in the Sprinter van type application. Chevrolet, GM and the Chevrolet Volt is a whole different concept for a plug-in. It's not clear to me, you know, what market segment people are going to go after first. Could you shed any light on that?

MR. VAN AMBURG: No, it's not clear to me either. We've started to look at some fast case scenarios for work trucks, for instance, where that might be one of the next steps where you could start adding some energy storage, even at the high cost they're at there is a cost benefit ratio. The real issue is, can you save enough petroleum in the differential fuel price to justify the increased cost of all the battery you put on board.

But I think if you look at something like the light duty cars, if you doubled the amount of energy storage in a Prius, not ten times or five times but just doubled, you'd have a pretty effective, much more efficient vehicle without adding that much more cost. And that seems to be a likely next step. And it may not be grid-connected immediately but it's moving to grid connection.

MR. JACKSON: And along those lines I think the architecture is still open too.

MR. VAN AMBURG: Yes.

MR. JACKSON: Whether it's a blend strategy meeting that or just using the power versus an all-electric. And I would guess --

MR. VAN AMBURG: I fully agree with that.

MR. JACKSON: I would guess -- Well it depends on the manufacturer. But I guess a blend strategy would be sort of the first step.

MR. VAN AMBURG: Eventually it's going to make sense to connect to the grid just for a variety of reasons but I think you're right in terms of the operational scheme. How you operate it really just -- it's also a piece of the cost. If you want a fully functional electric vehicle up to high speeds you have to have a different architecture for the energy storage as well as the driveline and the motor.

MR. JACKSON: Thanks for your comments.

MR. OLSON: Any others? Dave Smith.

MR. SMITH: Thank you. Dave Smith from BP. First off I want to mention that BP is actually installing cold-ironing on a couple of our vessels, operational here later this year. So maybe we can work together and we'll, you know, check out some of your numbers.

I thought -- Kind of a general comment. First is I think it's really important, and I'm not saying it hasn't been done in the report because I haven't read it but it is really important that we list the assumptions that are being made around these things.

I found recently, like with the low-carbon fuel standard or whatever, people make statements about what they think is going to happen and quite often it's people disagree with them but then, you know, if they actually say, well what are you assuming, well if that's what you're assuming that's a reasonable conclusion.

So it's really important that we all understand what the assumptions are or what you've included or what-not. So to the extent that you have that in your report, I know in the presentations today it is probably difficult to include all those but it is really critical, as we look at the report, to say, well how did they come to that conclusion. And I have found that assumptions is a big piece of that.

For example, it's like -- So anyway that's one point.

I've worked on several of the working groups for, you know, LPG or diesel or whatever. The whole idea of cost benefit analysis, I would say based on my experience there may be -- And I didn't work on the electrical group. The whole idea of cost benefit analysis is really a big deal and how you do that and what assumptions are being made, And so I don't know, is that a particular, is there a separate section? Is that being discussed individually in the report? Because how you make those conclusions result in really big different assumptions. So that's one question.

And then kind of a question to the Commissioners is how does our society decide, you know. If the society is going to spend money to achieve certain benefits, you know, who decides that that's the best place that state government spends that money as compared to spending it in other areas that could provide let's say other benefits, societal benefits that may be just as worthy. That's kind of a question to you.

But to Mike is, do you have a section on the cost benefit analysis and how you made those assumptions?

MR. JACKSON: I mentioned it just, you

know, before I launched into this during the methodology part. That cost benefit stuff that we presented here could use a whole half-hour presentation in itself.

MR. SMITH: Right. Well at least, right.

MR. MODISETTE: And there's really a lot, you're going to see that we're not all together on this even in the working groups. This is one idea. When I get to biofuels later today I'm not even going to present cost-effectiveness results.

MR. SMITH: Right, I don't think in that section we really talked about it so that's why I was wondering. But if that is going to be a key issue in comparing these technologies, which I'm not saying it isn't a bad way to go, but I think there should be a separate discussion chapter, whatever, around that whole thing. There are certainly a lot of experts in this state to do that. So anyway.

MR. JACKSON: And in fact it probably needs a whole workshop to do it, not just a half hour.

MR. SMITH: It could be, I would support

that. But thank you very much.

MR. JACKSON: Thanks, Dave.

PRESIDING COMMISSIONER BOYD: I don't know if I want to respond to your public administration question or not, Dave. Welcome to Sacramento. Welcome to those who operate in bureaucracies along with those who work under the golden dome across the street. That's how the decisions get processed and made. For better or for worse it's the best system on the planet.

MS. HALPERN-LANDE: Anna Halpern-Lande and I am representing both the Environmental Entrepreneurs and Tellurian Biodiesel. But in this comment I am speaking for Environmental Entrepreneurs. First I want to commend TIAX and Mike Jackson for a great report and the Commission for a really, this is a good hearing and a lot of good documents have been prepared for this.

I would like to join the Union of Concerned Scientists and other folks in urging the Commission and the consultants to look at the current prices for oil. I know that the crystal ball is very muddy but we can look at sort of what the forward projections are, refining capacity and so on, and have probably a higher high case than we currently do.

The second thing I just wanted to mention is that as we look at the plug-in hybrids, I personally have been in contact with a number of entrepreneurs who are working very actively on plug-in hybrids and other vehicles ranging from the economy, you know, sort of the Tesla model which has started the super car and move into the economy cars, to folks who are just focused on super cars and very high petroleum consumptive applications with looking at developing electric drivetrains especially in the light duty fleet.

And I would just urge TIAX to increase their high case because I think that we are still focused very much on the now world in terms of plug-in hybrids and I think we'll very quickly be in a world where we're seeing some pretty interesting innovations. You know, to the extent if you would like I can arrange for you to have interviews with those, those folks who are building those cars today.

PRESIDING COMMISSIONER BOYD: Thank you, Anna.

MR. OLSON: Asish, do we have anybody on the phone? Okay.

I think I'd like to go on to the next session here. Thanks for your comments. I think some of the comments were helpful for like a drivetrain. The overall comments I'd like to have, I'd like the comments to be specific to the technology sessions that we're going to do so I appreciate your efforts.

And our next section will be the natural gas fuel technology scenario. That will be a presentation by McKinley Addy from the Energy Commission. Could the panel members also join the table at the front here and McKinley will introduce them.

PRESIDING COMMISSIONER BOYD: While everybody is coming to the table and what have you I'll just comment on something that Dave Modisette said about no silver bullets. I think we're way into the silver buckshot era now.

MR. ADDY: Good morning Commissioners and others here. Tim has already introduced me and I'll just go ahead and introduce the folks that are around the table before I get into the presentation. There's Mike Eaves with the California Natural Gas Vehicle Association (sic). Ed Harte, are you here? Ed?

MR. HARTE: Harte.

MR. ADDY: Harte, all right. Charlie Ker?

MR. KER: Here.

MR. ADDY: All right. With Westport Innovations. Mitch Pratt with Clean Energy. Charles Powers with St. Croix Research. Jerry Wiens of the Energy Commission. And Mark, you are here. Did I miss anybody? Yes, John Vollmer with Sturman Industries.

MR. VOLLMER: Joe.

MR. ADDY: Joe. Sorry about that.

MR. LARSON: And Jim Larson with PG&E.

MR. ADDY: Thank you, Jim.

PRESIDING COMMISSIONER BOYD: McKinley, I'll remind you of how badly we're off schedule already so let's keep this moving along or plan on sleeping here tonight. (Laughter)

MR. ADDY: Okay. Well let me do some of the things I like to do when I do presentations. One of them is to acknowledge the folks who helped put this together. Susan Brown and Peter Ward of Commissioner Boyd's office for their feedback and guidance. Jerry Wiens, my colleague here at the Commission, he helped develop the fuel use volumes. And then our ARB colleagues, Barbara Fry and her team who gave comments on some of what we prepared and had some good conversations about them. The CNGVC and other stakeholders for providing critical market information. And finally our contractor colleagues, Matt Hooks and Mike Jackson for their work in completing the natural gas scenario.

The Center for Strategic and International Studies reports that the last ten years or so through 2005 the energy companies invested on average $10 billion a year in deep water exploration for oil and gas resources offshore West Africa. I cite that statistic to sort of frame what California might need to do if we're serious about introducing some alternative fuels into the marketplace. And keep that statistic in mind as I talk about the investment requirements for natural gas.

Imagine that you are shareholders of a company and you want to increase the core product that you sell, transportation fuel and you have asked your management team to increase consumers' use of that fuel. Your expectation would be a plan that has the following elements. The fuel use goals, not fuel hope goals, the requirements to achieve the use goals, the circumstances, conditions and actions to meet and even exceed those goals, identify the beneficial outcomes that flow from achieving those goals.

We tried to do so -- In meeting these expectations we've tried to do so in developing the natural gas scenarios and the scenario is organized a storyline. We examined three cases, a conservative case, a moderate case and an aggressive case. I'll highlight the results in the presentation of only the moderate case following the outline that you see on the screen.

If you take nothing else away from this presentation what I would like to ask you to take away is this page. The storyline for the natural gas scenario is that California will take bold action to increase its motor fuel natural gas use in a cost-effective manner, so that by 2012 and the other milestone years you see in the slide, 1 to 2.8 percent of its on-road transportation fuel will be natural gas under a conservative scenario.

Under a moderate scenario up to 9 percent of the state's on-road transportation fuel wold be natural gas by 2050.

And on an aggressive scenario up to 19 percent of the state's on-road transportation fuel will be natural gas by 2050. Achieving the natural gas fuel use goals enhance transportation energy supply by extending petroleum resources in corresponding amounts and reducing emissions proportionately.

No net material increase in emissions occur from the use of this fuel. A requirement under the AB 1007 legislation.

And then finally, natural gas lowers the state's Average Fuel Carbon Intensity under the Low-carbon Fuel Standard and helps AB 32 goals.

As I mentioned earlier, based on our analysis, on a full-fuel cycle basis this fuel and the scenarios evaluated result in no net material increase in emissions. And that is a very important criteria.

From the analysis we did we established these fuel use goals that you see on your screen. And I'll highlight a few for you beginning with the conservative case on the second row. So you can see that through 2050 about 900 million gallons of gasoline equivalent of natural gas could be used, corresponding to about three percent of the on-road transportation fuel demand.

And then for the moderate case I'll highlight the 2020. Again about 700 million gallons of gasoline equivalent through about 2500, 2700 million gallons of gasoline equivalent corresponding to the percentages of the transportation demand for the state.

And then under the aggressive case here it's possible that fuel use for natural gas could approach about 5.6 billion gallons. Again, the corresponding percentages of the on-road transportation fuel are shown in this row. And on the bottom line is the projected transportation energy demand through the years shown.

In establishing the fuel use goals we developed several key assumptions that covered the areas of the analysis. In the first column there you see some of the assumptions we made for the fuel use goals. We made some assumptions about vehicle, average vehicle miles traveled for the light duty class, the medium duty class for CNG and the heavy duty classes for LNG vehicles.

We also made some assumptions about fleet average fuel economy. And then the definition for the cases we looked at. For the conservative case there is a lot of unknown. For the moderate case there is a smaller amount of unknown so you can control for the fuel use goals. And then for the aggressive case we believe that you know a lot about what might happen.

We also made some assumptions about growth rates in the fuel use volumes from 2008 through 2039. And then we made some assumptions about the natural gas fuel use growth stabilizing in around the 2040 time frame to approximate the market growth rate for gasoline and diesel.

I will not go through the rest of the columns, you can see them in your presentation there except for the area of investment. We also made some assumptions about vehicle R&D costs, infrastructure R&D costs, and the incentives that I applied to achieve the fuel use goals.

The methodology we followed in establishing the fuel use goal included looking at the five year history of the natural gas industry's growth for motor fuel use. And then we adjusted the historic growth rates downward by about 25 to 50 percent to account for the conservative case.

We made no adjustments to the growth

rate as we made projections into the future. And then we increased that historic growth rate by 25 percent to model the aggressive case. We finally adjusted the rates for the analysis period through 2040 to the stable rate as I mentioned earlier.

And then for the vehicle population determination we simply determined the vehicle class of fuel economy, the corresponding VMT for that class. You do some math and you get the vehicle fuel use. You apply that to the vehicle population, apply that to determine the vehicle population.

For the cost-effectiveness we determined any incremental vehicle costs associated with the vehicles in the reference year. We determined an incentive that was required to reduce the cost. We determined any station costs and then the fuel cost savings or loss. Sum it over the vehicle population and then determine the present value of all of those costs by discounting. Dividing that number by the fuel use over the vehicle life.

And then for the investments we also determined the vehicle R&D costs, the sum of the R&D costs less incentives, and then determined the present value by discounting as well.

Any time you do an analysis and make some assumptions you introduce uncertainties. I will not go through all of the uncertainties that we considered but just to highlight the one affecting the fuel use goals in the left column there. Uncertainties are introduced from the adjustments to the historic fuel growth rate. Modulating the adjusted fuel growth rate over time to what we're calling an equilibrium rate or the stabilized rate that corresponds to the gasoline and diesel growth rate after 2014.

Other areas that introduce uncertainty, government policy consistency, oil prices, investor responses and of course product availability, whether it be the fuel or the vehicle offerings.

The uncertainties also promulgate through the other areas of the analysis such as the distillation of vehicle classes from the bulk fuel volume, using the average vehicle miles per gallon for the class category rather than specific classes of vehicles. But those are the uncertainties that I associated with our analysis.

And learning from our full-fuel cycle analysis experience, many of you wanted us to look at some of the sensitivities associated with the assumptions that we made and how they affect the results. And again I'll highlight the sensitivity of the fuel use goals to the equilibrium rate applied in the analysis.

What we found is if we chose an equilibrium rate of about 2.5 percent in 2040 and beyond it could change the results by about two times. So for example, when we found out from the fossil fuels office here that the gasoline and diesel demand growth rate was about one percent to I think one and a half percent it reduced our original fuel use goals in the aggressive case from about ten billion gallons to about what you see, what I showed you earlier.

In determining the fuel use goals for this analysis we had to consider the market conditions that apply. And these included market drivers, the barriers and then we also considered the resolutions for some of those barriers. Again, the left hand column, many of you are familiar with these type of market drivers.

Oil supply constraints. And Mike, I did add the high crude oil prices in this slide for you. Resource nationalism where people with oil resources are preferring to keep them for their personal use or play out the relationships between the big powers in our world.

Renewed interest in alternative fuels, competitive fuel supply, natural gas price advantage and then the policy initiatives of all that are listed there. As well the new federal initiatives.

The market barriers include fuel and vehicle availability, perhaps persistent or changing vehicle incremental cost, on-board storage technology, on-board storage cost, limited fueling network, consumer acceptance and lack of consumer awareness.

And then for the barrier resolutions we look at expanding product offering to deal with the issue of vehicle availability. Stabilizing the prices over time through consumer oriented pricing for also the cost and the on-board storage technology issue. Long-term, consistent support to deploy absorbed natural gas tanks.

As a point of interest, the University of Missouri in Columbia is researching using corncob for activated carbon production to develop a low-cost, flat panel, low pressure natural gas tank. Today we store natural gas at about 3,000 to 3,600 PSI. The University of Missouri people think that their tank would reduce that to about 500 PSI, resulting in fuel cost savings as well as improving the range that say a typical vehicle like the Honda Civic GX travels from 275 miles today. If you were to use that technology you could get up to about 300 to 330 miles.

The need to implement long-term growth plans including support for home refueling appliances. Consumer education and marketing promotion by the auto companies. In our discussions with the auto companies one of the things we found out was since 1998 when one company introduced their vehicle offering they engaged in no marketing of that product. It was only recently that they began to do some retail marketing.

This next slide kind of a picture of the natural gas fuel use goals in the context of the overall gasoline and diesel fuel supply. And you can see that under that conservative case it is just a sliver with the different slivers there representing the heavy duty LNG use, the heavy duty CNG use and the light duty CNG use.

Here is a graphic illustrating the moderate case for the natural gas fuel use goal.

This slide amplifies the sliver for the moderate case. As you can see in the lower right hand corner of the screen there on your presentation the light duty natural gas fraction of CNG vehicle is only about .51 percent. So much of the fuel use growth is driven by what is happening in the heavy duty vehicle segment.

After determining the fuel use goals Tim, our project manager, was very much interested in the requirements that would enable the realization of those goals. And so we then calculated the vehicle populations that correspond to the goals for both the light duty CNG vehicles, the heavy duty CNG vehicles and the LNG vehicles. And those are the populations that you see on the screen.

We also needed to determine the corresponding infrastructure that would facilitate the fuel use goals. And you can see the numbers there segmented by station classes. Home refueling units quite large. We assume that about 40 percent of the light duty CNG vehicle owners would probably take advantage of the convenience of refueling at home as well as the price advantage that that particular option affords them. And then the rest of the station sizes and the station requirements are shown.

That was for, the previous slide was for the conservative case. This shows the corresponding vehicle populations and infrastructure requirements for the moderate case.

Maybe I should point something out here. Through 2050 for the light duty CNG vehicles we see that the population zooming to about 76,000 from this analysis. The prior slide showed that to be about 26,000 vehicles. We think that those two ranges of vehicle populations for the light duty CNG option are quite reasonable. It would take several manufacturers to perhaps meet that but I suspect that the only manufacturer of light duty CNG vehicles today could easily support those population ranges if they were to continue in the market.

So I talked to you about the fuel use goals, the framework for our analysis, and I want to talk to you now about some of the benefits that flow from the natural gas fuel use goals.

From our full-fuel cycle analysis on a

well-to-wheels basis compared to the conventional fuels, gasoline for the light duty vehicles and diesel for the heavy duty vehicles, this slide shows the relative emission benefits that result from natural gas use. A 21 percent reduction for light duty vehicles and about five percent to about ten recent for heavy duty vehicles.

Because of the improving emission standards through the years past 2010 the relative benefits from natural gas engines compared to the conventional fuels is sort of negligible. But for toxics and hydrocarbons you can see that the benefits are significant. Mike, again, I followed your advice and showed the question marks for emissions past 2022.

This slide is more illustrative than anything else. Many of the stakeholders have asked us to frame the AB 1007 work in the context of other policy initiatives in California. And so this slide attempts to illustrate what kind of benefits would result from the natural gas fuel use goals being achieved in relation to AB 32.

And for 2012, based on the vehicle populations we calculated you can see that there's a kind of a relatively small benefit under the conservative case and similarly for the moderate case and as well for the aggressive case.

The numbers here again are illustrative. If California needs to reduce greenhouse gas emissions from the transportation sector by about 70 million tons, and as I understand from the AB 32 framework, about 40 or so percent of the total 175 million tons required need to come from the transportation sector. And if there were a schedule over the three milestone years there to achieve the 70 million ton reduction goal from the transportation sector that's how it sort of might, might break out.

The legislation also asked us to look at the economic benefits in terms of cost-effectiveness. And I want to make this comment here. On the conversation about cost benefit analysis when Mike was talking about the electric drive technologies. AB 1007 does not ask us to do a cost benefit analysis. We are to look at the cost-effectiveness for increasing the use of alternative fuels in California. So we don't necessarily at least quantify the associated environmental benefits by monetizing them and showing that in a calculation and I think Mike is aware of that.

What we did here is to evaluate several natural gas fuel production pathways and vehicle combinations.

We looked at the production costs and then optimized those costs surrounding production pathways.

And then we determined the most cost-effective production pathway and vehicle combination that satisfied the environmental criteria of no net material emissions increase and then the economic criteria of cost-effectiveness.

And again based on analysis and the assumptions we made if our calculations are right, the cost-effectiveness for natural gas fuel use under the scenarios ranged from about -54 cents per gallon of gasoline equivalent to just about under $1. And I'll explain to you what the negatives and the positive numbers mean.

You'll see later on the results as we presented them as a function of time.

The cost-effectiveness as applied here is the ratio of the net sum of life cycle costs to the sum of fuel used over the vehicle's useful life. And it represents the cost to get one additional gallon of gasoline equivalent of natural gas to market.

The negative cost-effectiveness means an overall benefit to the market actors under the assumptions made. And then the positive cost-effectiveness means some cost to market actors including the government.

Important to note here, if the cost-effectiveness -- One way to interpret the cost-effectiveness is to consider the prevailing cost of gasoline in any milestone period. And if the cost-effectiveness is less than the prevailing cost of gasoline in that year then it is considered to be cost-effective. At least that's the way we applied it.

No environmental benefits are monetized or included in the calculations.

I want to share with you some of the cost assumptions that we made in establishing or determining our cost-effectiveness numbers. All of these vehicles have an incremental cost associated with them. We broke out the analysis period into three segments, a near-term segment corresponding to the years shown on the screen. A mid-term segment and then a matured market segment corresponding to the years you see on the screen.

And as we can see over time the incremental costs decline as a function of the vehicle -- I'm sorry. Learning curve effects and so on and so forth.

The same thing applies to the home refueling units and the rest of the infrastructure network. The vehicle costs represent incremental costs. The station costs or the infrastructure cost are absolute costs.

So if you apply all the cost information into our calculation, considering he investments for vehicle and infrastructure R&D, any incentives that are necessary, these are the numbers that we developed from the analysis.

The next slides will show you the investments that are required to realize the fuel use goals. Tim was very much interested in wanting us to quantify the cost information. And to take your mind back to the beginning slide or my beginning comments, these numbers will appear to be big but they are only big -- they are not that big in the context of what I mentioned earlier. The energy company is investing about $100 billion a year just to find additional oil and gas resources offshore West Africa.

There are two investment numbers that are shown here. The first represents the vehicle R&D and infrastructure R&D costs. The second investment numbers you will see includes vehicle incentives and infrastructure incentives.

These investments are required to support three vehicle product offerings in the light duty, medium duty and heavy duty classes and the flexible fueling infrastructure.

So I will just draw your attention to the very last column. For the period of 43 years if California wants to ensure the increased use of natural gas we can expect to invest about $2.3 billion in 2007 dollars for the conservative case. For the moderate case about $4 billion and for the aggressive case about $4 billion.

The numbers for the moderate and aggressive cases remain the same because we assume that once you develop a certain critical mass for the vehicles in the marketplace then commercial activities and commercial factors take over and the market becomes self sustaining.

When you add in the incentives for both infrastructure and vehicles the numbers increase slightly, somewhat as you can see. Again calling your attention to the total dollars required in the right column there. For the aggressive case about $7 billion, for the moderate case -- I'm not pointing to things. $7 billion there, about $6 billion here and about $3 billion here. Again keep in mind this is over a 43 year period.

Also this doesn't mean that the money comes from government entirely. There is a mix of private and public actors in these marketplaces and the assumption there is any -- the investments could be structured any number of ways.

One of the concerns that some of our colleagues shared with us was the appearance that we assumed all of the vehicle and infrastructure incentives would come from government. Not necessarily the case. You could structure it either one-third coming from the state government, one-third coming from the federal government and one-third from the private sector or half and half. However you want to cut that meat you can do that.

This slide attempts to capture the effect that the increased use of natural gas might have on the average fuel carbon intensity in

California. Mike I'm sorry, I tried to change this slide but I was too tired last night so it shows what I showed you yesterday and I'll to explain it. Because when we presented the slide it's been sort of difficult for people to capture.

The numbers in the rows that correspond to the different cases, for example this two percent here, suggests that if California were to attempt to change the average fuel carbon intensity from a nominal value of one to say .99 by 2012, .95 by 2017 to achieve the ten percent change by 2020 the natural gas fuel use in this year under the conservative case would contribute about two percent to that change over that time period. I hope I haven't confused anybody by saying that.

Similarly in 2050. If we were to maintain the AFCI through that year at .9 then the natural gas fuel use under the aggressive case, about six billion gallons, would contribute about nine percent to maintaining that change from .95 to .9. And everybody is confused.

So I've talked to you about, again, the fuel use goals, the framework for our analysis, the assumptions we made, the environmental benefits. And this shows that in order to achieve the fuel use goals several actions and actors are required to realize the outcomes.

And we have broken down this slide into the different categories of actors. So for the state and federal government you see those actions, the industry, the investment community and then consumers. Tim has been very interested in this whole idea of shaping the fuel excise tax by carbon content. It might be one of the recommendations. We don't know what our management and policy makers would say to that.

Reshaping program funds by carbon content, establishing sliding scale vehicle incentives to reduce the incremental cost by about 50 percent to 100 percent. Again some incentives for station infrastructure.

Being consistent in our investment in R&D on the state and local government side. Buying NGVs. The folks have told us that New York has shown a great example by buying a lot of Honda natural gas Civics. Perhaps California could emulate that.

For the federal government we would want to look at extending vehicle and infrastructure tax credits through 2040. Because one of the feedbacks from our stakeholders is that they would like to see some policy consistency. If the government is going to give some form of support over the years it would be good that it goes beyond at least one year or two years or three years so they can do their investment planning, product roll-outs and so on and so forth.

For industry the auto companies need to expand their vehicle offerings to make sure that they price the vehicles right. They also need to engage in targeted ad and marketing.

Similarly for the fuel producers and fuel retailers. One of the inputs to us in a focus group meeting by people who were interested in alternative fuels but really never used alternative fuels was that perhaps utilities could include in their bills and the energy companies could include in their credit card bills information about the location of alternative fuel stations as they rolled out. They want to know why alternative fuels are important. They also like to know how it is going to benefit them and so on and so forth.

The investment community. We think this

is a very important category of folks to talk to. Over the last two years we have spent some time talking to some investment banking folks. And what we found out is they are very ignorant about the opportunities in the advanced transportation technology sector in investment space. They know the power sector, the investment opportunities. They know about the financial services sector, they know about the hotels and health care services. But they don't know about the advanced transportation technology sector.

Tim is also very interested in making sure that they educated about including benefits in determining -- carbon benefits in determining their return on the investment.

I was very pleased to hear at the ARB's ZEV hearing last week, a gentleman from Deutsche Bank who was interested in ways of capturing the carbon credits from the sale of electric vehicles and packaging that as an asset to then take to the financial markets to help capitalize some of these companies. I thought it was very, very -- an interesting contribution to the CARB hearing. Because I have been looking for people like these for a long time to say look, take a look at the current transportation section.

Finally, consumers. They need to learn about natural gas vehicles, they need to buy natural gas vehicles. They need to learn about home refueling units, station locations and so on.

Tim wanted us to identify specific entities in the categories that you see across the screen there. So all of those companies need to expand their vehicle product offerings.

The fuel providers need to make sure that they expand their fueling station networks.

The nonprofits, we don't leave you out. CNGVC, CALSTART, the Environmental Coalition, NGV America.

The investors, we don't leave them out. Boone Pickens is very active in his investments in clean energy. This is public knowledge. They need to include carbon benefits in their return on investment determinations. And then CALPERS and CALSTRS also need to be involved if they are going to support California achieving its public policy goals.

And then consumers need to take advantage of the vehicles that are out there and learn about them.

So all of the actions that I talked about actions and actors by category will turn out to be recommendations and we think adopting the plan would be a good idea. That's the presentation.

Okay, Tim wants me to go through the panel. I guess I'm supposed to ask --

PRESIDING COMMISSIONER BOYD: Let me remind you, McKinley --

MR. ADDY: Yes.

PRESIDING COMMISSIONER BOYD: -- that we allocated 35 minutes to this subject and you just took the entire 35 minutes.

MR. ADDY: I did? Okay. Really?

PRESIDING COMMISSIONER BOYD: So in deference to the panel members who are many I would just ask them to be crisp, clipped. And if somebody ahead of you makes a point you want to have made please just ditto that fact to add your support and don't make a complete presentation on the same issue.

MR. ADDY: Okay, with that guidance, Mike, do you have a comment on what you've seen and heard?

MR. EAVES: Yes, I'd like to go over several things. Mike Eaves, California Natural

Gas Vehicle Coalition. This has been a very interesting exercise because the Energy Commission used a totally different analytical approach and arrived -- than the NGV industry and we arrived at very similar but not identical results.

As you remember from previous presentations we indicated that in the 2025 time frame that we were looking at a one to two billion gallon petroleum displacement. And as the Energy Commission staff has indicated, that is primarily going to be in the area of heavy duty vehicles, not light duty vehicles.

We look at the various cases, the conservative, the moderate, the aggressive case. We really focus on what you call the moderate case. We call that the most-likely case for our industry. That's the case where fuel sales engage, fuel providers engage, vehicle manufacturers to produce the vehicles and we have, we have all the economies of scale with vehicle production, engine manufacturers and fuel providers.

We want to -- A couple of other -- There's a couple of slides in there on where natural gas fits in the total fuel outcome, it's in slide 11 and 12. You know, we've indicated that what the Commission needs to look at is look at the natural gas penetration. Primarily in the diesel on-road market because that's really where our target market strategy is. We're not ignoring light duty vehicles but you see the numbers and the light duty vehicle penetrations as far as fuel displacement are like ten percent to what we're going to be doing in the heavy duty arena.

And we can achieve -- While he's talking about maybe the aggressive case reaching 19 percent of total fuel. If you take a look at on-road vehicles that could be up to 45, 50 percent of on-road fuel displacement of diesel. So I think there is a different metric there that you need to take a look at.

On environmental benefits, on greenhouse gases it shows heavy duty having a five percent reduction in the well-to-wheels study. That number was more like 20 percent using North American natural gas and it drops off. So it was a range. And we think that that's the low end of the range, not the high end of the range or even the mid-point of the range.

In the low-carbon fuel standard report

that Berkeley has come out with they came out with the gasoline with 5.7 percent diesel -- 5.7 percent ethanol as having a global warming index of 93. They originally had it at 79 as a global warming index for natural gas but that global warming index they did wrong and that number is really 68. So I think there's more greenhouse gas benefits than are captured here.

The other probably -- Two last points. Capital and the infrastructure. That capital is probably borne by private investors and the consumers. That's how the market is developing now. Probably 10 percent, 10 cents on every dollar going into infrastructure is public money, the other 90 cents is private funding. We expect that the capital can be provided to the market and offer the fuel savings to the customer without necessarily needing government subsidies for that.

Also on slide 21 on the cost-effectiveness. You can see on the moderate and aggressive, on the heavy duty side the numbers are negative, which means it's very cost-effective. You see a bunch of positive numbers in the middle but that is with an increased penetration of light duty vehicles, which are really not the most cost-effective market so that biases those numbers. And if you were to take a weighted average of cost-effectiveness of heavy duty and light duty you'd be negative numbers all the way across the board.

MR. ADDY: That's correct, Mike. That's correct.

MR. EAVES: That's my comments, thanks.

MR. ADDY: Anybody else on the panel? Go ahead.

MR. SWEENEY: My name is Mark Sweeney and I'm a consultant working with the California Natural Gas Vehicle Coalition. And my question --

PRESIDING COMMISSIONER BOYD: You have to use the other mic.

MR. SWEENEY: -- relates to assumptions and methodology and gets to the issue of the assumptions about the relative fuel cost advantage of natural gas in contrast to diesel and petroleum fuels. One of the things that's really been driving the growth in the NGV market is the fact that consumers can achieve fuel cost savings by using compressed natural gas as opposed to gasoline or diesel.

And this price advantage has been

growing and every credible forecast I've seen suggests that it is going to continue to grow in the future, Especially so with higher levels of oil prices.

And although it isn't clear from any of the information that has been presented here I think what has occurred is that the staff has taken an estimate of that fuel price advantage in the last year, measured somehow, and basically made that a de facto projection out through 2050.

So my sense is that there was an effort to avoid getting into the forecasting tangle so the corrective measure for that problem was simply to assume the present conditions persist indefinitely into the future without change. Which is the one thing I think that almost certainly won't happen.

And again, everything that we know leads us to believe that the fuel price advantage for natural gas over gasoline and diesel will increase in the future. And we think that needs to be reflected in the analysis or else there be some justification provided for the validity of the assumption that numbers that have been measured in the last year are expected to attain in 2050 and every other year of the forecast period.

MR. ADDY: Thank you. Anybody else? Yes, please.

MR. PRATT: Hi, Mitchell Pratt with Clean Energy. Just a few comments. I think on some of the R&D numbers that you have we also need to consider the growth of NGVs around the world and the investments that the OEMs are making elsewhere around the world. And the minimal cost to bring those same products here to the US and then make them applicable. Of course we've got to do crash testing and other protocols.

But the Dodge Sprinter van that's taken off, it has been a great success here. We know that that's available in Europe as a fully dedicated natural gas product. And there are other products similar to that that could be brought over and made available here.

When we look globally we have seen over the last couple of years about two and a half million vehicles added around the world. We see strong programs in other countries. And these are usually driven, driven programs from the state, the heads of the country themselves. But there are national movements to incorporate and they have generally focused on the light duty segments. So that product is again available.

We have focused our company on the heavy duty segments. To go for the large fleet users, the anchor tenant that refuels every night. And what I am not sure that we capture here for even the medium duty and some of the other transportation segments is the compounding effect that you have as you continue to establish a network that we are using our money in building. Opening up public access that allows others to then participate and to participate at a much lower cost.

So I don't know, because I haven't read the full report here. I don't know how that has been considered or contemplated in the evolution of the market, both on the vehicle development or the infrastructure development side.

I would say that for the Commissioners an important stepping stone right now is to encourage the policies that have been out there and that are out there being contemplated or that have been proposed. To make a dramatic support for those, for those programs.

As you all know as well as I do the San

Pedro Clean Air Action Plan contemplates replacing 5300 trucks with natural gas LNG trucks. That has stimulated Kenworth to work with Westport to incorporate that engine and they're pursuing product line development of that. That has further stimulated the interest of Freightliner to be competitive and offer their products into the marketplace. When you see vehicle sales, and that's all the competitive business world is about. When you see an opportunity to sell and it's consistently supported they'll follow suit and make the product available.

So right now, to put it in context another way, for all of these goals, those 5300 trucks equate somewhere around 70 million gallons annually of fuel displacement. That's 100 percent fuel displacement and offers emissions reductions and all the other good things that natural gas has as well.

The final comment that I'll make, two ideas I guess quickly, is the one of biofuels. I don't know how much has been contemplated in the report of the benefits of natural gas from landfill projects but there has been quite a bit of interest in that. And as we talk to the refuse market they're excited on that from other angles, keeping their landfills open and available. Important to their operation. But a willingness to go to natural gas trucks to further support all of their market positions.

And landfill I think, and refuse trucks related to that, is a wonderful market as is transit and airports where we have a great opportunity. And we have product available today to move that all to natural gas and get the benefits and continue to stimulate the market. Thank you.

MR. ADDY: John (sic) Vollmer from Sturman Industries. Your company is working on technologies that improve the efficiency of engines. Could you take a minute and just share with the group how some of those technologies improve the efficiency of natural gas engines.

MR. VOLLMER: Sure. My name is Joe Vollmer. I work for Sturman Industries out of Woodland Park, Colorado from my residence near Ann Arbor, Michigan. I'd like to speak briefly about a technology that really is applicable to natural gas but to many of the other fuels that we're discussing today, in particular biodiesel, biofuels.

First I'd like to thank the CEC and Air Resources Board. During the past month the Sturmans and I have made visits to both agencies and the reception has been very warm towards the new technology that we have been, just started releasing to the public and describing to the agencies here.

Sturman Industries is a research and development center specializing in engine controls, hardware and software, particularly known for fuel injectors and hydraulic valve actuation, our camless engines.

The goal at Sturman Industries for many years has been to increase the efficiency of the internal combustion engine and protect the environment. The emphasis has always been to do this in-cylinder, emissions reductions without treatment devices and their inherent mass costs and on-board diagnostic issues.

The current status. A patent has been awarded to our new combustion cycle. This enabled by the camless engine and the new fuel injector technology. This is not pie in the sky technology. We have projects with the Department of Defense, the Department of Energy, Mack and others.

We have an engine on a dynocell right now generating power and we are collecting emissions and fuel economy data. We've started sharing this data now with El Monte. What we are seeing right now during this data collection is simultaneously power into the increase, fuel consumption decrease and emissions reduction.

But most importantly and pertinent to the topic today is multi-fuel capability. The fuel injector designed by Eddie Sturman can run multiple fuels. So currently it is running a B95. As you've heard from the industry, in the past there's been lots of discussion about the inability of fuel injection components to run higher levels of biodiesel and we have a solution for that.

Secondly, since we are cylinder to cylinder, closed loop combustion control, we can actually adapt cylinder by cylinder for the fuel or even by chance a mix of fuels in the same cylinder.

I think I'll save some of the technology session for the sake of time here for meeting with your staffs. But I would like to again thank the CEC and ARB and their staffs for our recent meetings that we've had. We look forward to working with both groups to take this from the development, which is complete, into demonstration projects at the ports and at other areas that are identified as being pertinent. Thank you.

MR. ADDY: Thank you, Joe. Any other panel member with a comment?

MR. KER: Very quickly in the interest of time. Charlie Ker from Westport Innovations and our joint venture Cummins Westport. We manufacture natural gas engines in the heavy duty applications such as transit, refuse and Class A trucks. I just wanted to thank McKinley and Peter and Jerry for their work on this and we look forward to helping the state achieve their goals in terms of greenhouse gas petroleum reduction.

And since we're in Sacramento I thought it was important to note that next week Cummins Westport will be launching the cleanest heavy duty production engine. When I say launch, it will be rolling down the Cummins plant in Rocky Mountain, North Carolina. This will meet the 2010 emission goals and Sacramento is the first order for that engine. So thank you, people of Sacramento. We look forward to deploying these elsewhere in the state.

And as Mitch mentioned, we also look forward to deploying the Class A heavy duty trucks in the port and elsewhere throughout the state. Again to further the goals that have been discussed this morning. So thank you very much.

MR. ADDY: Any last comments from the panel?

MR. LARSON: Jim Larson with PG&E's Clean Air Transportation. Ditto to Charlie's compliment to the staff for engaging stakeholders. I think the end product really speaks for itself. And with some of the tweaks that Mike brought up and others we would support adoption of the scenario that you've presented.

We also are interested in revisiting the regulatory treatment of the utility-based programs as well and support that and would like to work with the Commission, the PUC and others as we move down that path.

We probably didn't adequately anticipate the groundswell of interest in this area when we filed our last rate case, particularly on the electric ride side but the natural gas side as well. So we welcome the opportunities to expand those programs in order to meet this growing demand. Thank you.

MR. ADDY: Anybody else? Okay, Tim.

MR. OLSON: Before you leave, any questions from the audience or on the phone? Why don't we take the question from the audience first and Asish if you'd line up the phone.

Yes sir. Please state your name.

MR. VAN AMBURG: Bill Van Amburg from CALSTART. I just actually want to echo and maybe amplify something that Mitch said. When we really look out towards 2050 it seems that renewable methane, biomethane, is really something that needs to be factored in. I'm not sure because I haven't read the full report whether it has been or not but California actually has a memorandum of understanding with Sweden, which is a real leader in biomethane use. Not just even from landfill but more broadly.

And I think when it comes to the greenhouse gas implications of natural gas it builds an even better case in terms of that fuel blend and the climate neutrality of that piece of it. So I think that's a really important piece to look at, especially in your long-term scenarios.

The other thing I would just ask about. In Europe they are really finding a decoupling of price between petroleum and natural gas. And as you looked at the deltas did you see that split? Was it going to continue to track petroleum but be below? What were your scenarios on that?

MR. ADDY: You would ask that question, wouldn't you. Let me share this opinion, and it is not representative of anything the Commission thinks. There is abundant information to support the idea or the notion that natural gas and crude oil prices will not necessarily continue their link as has happened historically. I think there is a need to investigate that because of the huge implications that can have for many of the alternative fuels since natural gas plays such a role in either the production or serving as the feed stock.

I know several people have looked at this. The University of California at Berkeley, they've looked at about 11 studies that have been done by the Union of Concerned Scientists, ACEEE, EIAEA, the Federal Reserve Bank in Texas. That suggests the displacement of natural gas for the power generation sector from other resources such as renewables -- I can say this, right, Commissioner? Advanced coal, not necessarily in California, and there is another big bogeyman that I am not going to mention.

The impact of these other resources is likely to displace natural gas from the power demand sector. And if that were to happen, taking that into consideration with imports of LNG, you might likely see it is a different trajectory from natural gas than you've seen previously. Combine that with the growing demand for petroleum fuels in the developing countries, China and India, there's reason to consider that.

PRESIDING COMMISSIONER BOYD: Bill, a short answer is we struggle with this issue about as much as we struggle with the issue of trying to properly forecast the price of crude oil. McKinley is not wrong. The fundamentals indicate there should be a greater break away than there has been but it's hard to break tradition.

And so in estimating natural gas prices we have been, for purposes of the 2007 IEPR, and speaking as the Chairman of the Natural Gas

Committee for this organization, we have been trying desperately to force that decoupling and come up with a better way to estimate. But it is tough to break long tradition. And maybe if it happens in Europe it will spread over here a little bit more.

MR. VAN AMBURG: All right, thank you.

MR. OLSON: Okay, could we go to the person on the phone?

MR. GAUTAM: We've lost him.

MR. OLSON: Okay, we're not going to go. Anybody else in the audience here? Yes.

MR. SMITH: Dave Smith from BP. Just a real quick question, McKinley. With the home refueling is there -- I know there's been a lot of discussion about natural gas fuel quality. Has that been part of the discussion and would the utilities be responsible for ensuring the natural gas provided to the home met the vehicle natural gas standards?

MR. ADDY: Can I ask one of you on the panel to respond to that, please.

MR. HARTE: Ed Harte with SoCal Gas and San Diego Gas and Electric. With respect to the home refueling appliances, that's actually an issue that we have.

We have been in discussion with the ARB staff when it comes to the ARB CNG fuel specification. The reason is in our discussions with the vehicle manufacturers that would typically use a home refueling appliance, those vehicles can operate on a very wide range of natural gas quality, well beyond what is currently allowed under, under our tariffs. So we actually believe that there really isn't any sort of need to apply the ARB CNG fuel specification to light duty vehicles and home refueling appliances which are designed to serve them.

With respect to how they're currently impacting the installation of these appliances, we do our best to try and assess what the gas quality would be at any particular residence where they would be installed. If we cannot insure that the gas quality will meet the current ARB fuel specification we'll typically deny homeowners from installing those particular appliances.

So I would simply like to take this opportunity to urge ARB to take another look at the CNG fuel specification and consider some, I think some common sense changes to not only update it to a performance-based specification but also to eliminate the need to apply it to appliances and to vehicles where it really doesn't apply.

MR. ADDY: Thank you.

MR. OLSON: Mitchell, do you have a comment?

MR. PRATT: It's a little bit, it's off this topic.

MR. OLSON: Okay, let's go to this question first then.

MR. NADEAU: John Nadeau with Hythane Company. We have seen significant environmental benefits by using natural gas blends, specifically hydrogen with natural gas. I'm wondering if you used any of that in your study.

MR. ADDY: We did not consider Hythane in this analysis.

MR. NADEAU: Do you have any -- I certainly encourage you to do so, Do you have any plans to do so?

MR. ADDY: We will take the comment into consideration as we finalize the work. Okay, thank you.

MR. OLSON: Okay, Mitch.

MR. PRATT: If I could I'll just

piggyback on that to let the Commissioners know that Clean Energy has built a blended fuel station and we have that station in Vancouver, Canada. It was a natural gas transit station, it still provides natural gas to the transit busses. But we have also added a hydrogen component to that and are blending fuels for some test vehicles there. Early results are showing, as they have in other locations, that emissions are further reduced by about 50 percent.

So it appears that that might be a cost-effective way to further promote hydrogen into our society. The dispenser that we have co-produced is one that offers a range of fueling from pure natural gas to pure hydrogen and any blend in-between.

On other point I'd like to make on the point of natural gas. Maybe you all understand this. But when we see natural gas prices reported in the paper you see a $/MCF and that price goes up and down. Well to equate that for our commodity cost, there's about eight gallons of gasoline gallon equivalents for every one MCF, for $1. So for a $1 increase that's only 12 cents commodity increase at our pump.

So if you see a swing in the wintertime of $4 an MCF, that's only 50 cents at the pump in its worst-case scenario, assuming that there is no blending or averaging of prices from the utility. So it's a tidbit of information, a good party favor. Thank you.

PRESIDING COMMISSIONER BOYD: Thank you.

MR. OLSON: Yes, Jim Larson.

MR. LARSON: Just real quick. We have a hythane application under construction as well at our San Carlos CNG station. Hythane is coming and there's going to be some infrastructure in the Bay Area probably by next year.

MR. KER: And just a very quick comment. Mitch mentioned the HCNG transit program in Vancouver that is part of the BC hydrogen highway. And of course Governor Schwarzenegger is in Vancouver today probably riding around in one of those busses.

PRESIDING COMMISSIONER BOYD: We're reasonably familiar with hythane, we've had tests. On-line, for instance, has done that. Since this topic we're discussing, it's already been admitted that this issue is going to run for a long, long period of time. We'll do our report but obviously the subject of alternative fuels and low-carbon fuel standard is going to go on for a long, long period of time. Maybe next time around hythane will make its way to the table. Or maybe the hydrogen panel later today will pick up the baton for you.

MR. OLSON: What would be helpful to us, if you could provide any performance data or your estimated capital costs. That will be real helpful to include in any discussion of the hythane HCNG.

I'd like to ask one other question of Jim Larson and Ed Harte here. You saw two, a moderate and aggressive case for natural gas vehicles here. In terms of natural gas supply is that, do you have a comment on whether there will be a problem in terms of fuel supply?

MR. LARSON: I looked at the -- through the 2017 aggressive case from an infrastructure standpoint and the established gas transmission and distribution system is certainly capable of delivering those volumes of gas. I haven't looked beyond that 2017 aggressive case, which is approximately equal to the 2050 conservative base case.

MR. HARTE: We certainly looked at the moderate case, or as Mike described it the more likely case. We don't believe there is going to be any impact on our current infrastructure and our current plans for increasing that. As far as the more aggressive case I'd have to defer that for some folks back in my engineering department.

MR. OLSON: Okay.

MR. EAVES: Just a further deal on that. A billion gallons, a billion gallons of natural gas displacement of petroleum, a billion gallons is equal to about five percent of California's current send-out. It's really interesting to look at the 18 billion gallons of transportation fuels now in California.

And if you look at the total gas send-out market in California for all applications, power generation, industrial, commercial, residential, the size of the markets are just about identical. About two and a half trillion cubic feet a year going out in natural gas markets. And if you take billions of gallons and convert that you get about 2.4 trillion equivalent cubic feet of natural gas.

So a billion gallons is five percent of

the current send-out if we were at the aggressive scenario. To meet the moderate at two billion gallons, that would be roughly about nine percent of California natural gas send-out would be for transportation fuel.

PRESIDING COMMISSIONER BOYD: Okay, Mr. Olson, you better wrap this up.

MR. OLSON: Yes, I think that will be it for this panel. I appreciate your effort and your comments.

I would like to now bring up the next speaker. Larry Waterland will be presenting the propane scenario. And the panel members for propane please join the table at the front here. And Larry, if you can, I'd like to try to have our scenario presentations, try to keep it to around 15 minutes maximum.

MR. GAUTAM: Asish Gautam with the Energy Commission. I think we have some people on the line. Bob.

MR. MEYERS: Bob Meyers here for the Western Propane Gas Association.

MR. GAUTAM: Thank you, Bob. Eric.

MR. FEEHAN: This is Bryan Feehan with the Propane Education Research Council in

Washington, DC.

MR. GAUTAM: Eric, are you on the line? I think that's all we have.

MR. WATERLAND: I'll take everyone's admonition to be brief here. My objective was to get you out to lunch today. I guess that's consistent with Commissioner Boyd's objective of not sleeping over here tonight. I've got my watch out. I'll take a look at it and try to keep going.

What I'd like to talk about is propane, liquified petroleum gas. Really we're going to be discussing the results of an analysis that was largely put together by staff. And I recognize here the three Energy Commission staff members Asish Gautam, Erin Bright and Mike Trujillo, with some coordinating support from Gregory McMahan of the Air Resources Board.

Good. And in keeping with being brief you can see that my agenda is not quite as aggressive as other people's. So going through briefly the methodology that was used.

The propane story line, it was mostly stakeholder group driven. It was a propane working group. A couple of members here are sitting on the panel and also by the phone. Three full meetings were held between late summer and early this year along with a bunch of relatively detailed one-on-one meetings and a lot of, I suspect, one-on-one phone conversations.

The data sources that were used to develop these scenarios were the usual ones for energy use. The DOE's Energy Information Administration, Western Propane Gas Association, the National Propane Gas Association and DOE's Alternative Fuel Data Center. And from these data sources, which sometimes disagree, a group consensus was made with respect to how one constructs the parameters you need to do some forecasting, which are things like fuel economy, the number of vehicles in fleet use and VMT and that sort of thing.

For the scenarios vehicle sales projections were defined and these were thought to be realistic and achievable. And then based on these vehicle sales projections a set of assumptions was put together that said, if these assumptions happen this kind of sales level could be met.

Just note here the list of organizations working with the working group. You see a lot of propane suppliers and trade associations, you know, along with equipment manufacturers and vendors.

Okay, what are the assumptions we used. We looked at three scenarios just like everyone else has. The one has been called conservative I'll call it business-as-usual, moderate and aggressive. And this is a level of sales that the group consensus agreed could probably be reached if certain assumptions were met. so these three levels are 5,000 vehicles of sales a year by 2010 and 10 and 15.

Fuel use data was -- Fuel use using VMT, fuel economy, came from CALCARS for light duty vehicles and from DOE's database for medium and heavy duty vehicles.

With the analysis a constant lifetime was assumed of ten years. This says that after, ten years after you reach your plateau of sales you've got ten times your plateau of sales in use.

The target markets that the propane industry looks at are largely medium -- large, light-duty vehicle and medium-duty vehicle fleets. In the near-term for the business-as-usual scenario again mostly fleets Large light duty vehicles, taxicabs, other -- you know, shuttle bus, school bus, delivery vans, that sort of thing.

For the moderate growth scenario they looked at greater penetration within fleets and added some consumer penetration. We're not competing a whole lot with natural gas here because this is really a medium duty vehicle application instead of a heavy duty application.

And as for aggressive growth we added a consumer market in addition to a higher fleet penetration. And these are the assumptions that underlie all the analysis, which I won't go through very much.

The business-as-usual says nothing really happens except that the propane industry will agree to price fuel at a 25 percent discount on a GGE basis from the competing, conventional petroleum fuel. So regardless of what the fuel forecast you use is, the projection is that propane fuel as a vehicle fuel will always be at 25 percent discount from that. The conservative case ensues that in-place incentives remain.

The moderate growth scenario assumes

that ARB simplifies their vehicle certification process. This is somewhat costly in a vehicle manufacturer's mind. And especially when you consider the fact that they're only selling several thousand vehicles a year and it's hard to distribute the cost of certification of kits and eventually vehicles to what the ARB requires due to the reasonable cost.

It assumed that there would be some consensus over a vehicle fuel spec. The arguments here are much like CNG. LPG or propane fueled engines can run on a whole variety, you know, a range of propane qualities. So while there is a fuel specification it could be argued as to whether that really needs to be in place or not. And the industry says, let's reach consensus on what needs to be the spec and then we will supply sufficient fuel to meet that.

Increased incentives were assumed and the vehicle warranty issue came up with the moderate growth scenario. You know, the fact that they want OEMs to warrant their vehicles when they get retrofitted with propane kits.

And the aggressive scenario is essentially moderate plus some tax breaks, increased incentives. But the big thing here is that now OEMs enter the market place to the conservative and moderate assumptions The fleet marketplace is largely a retrofit. It's kit retrofitters of propane fueling systems to engines. In the aggressive growth this sees that the OEM starts entering the marketplace.

These are the incentives that were assumed. I won't go through these very much. They're wrong here so read the, I think read the paper that accompanies this. This was prepared with the earlier version of the analysis and so the federal incentive is up a little bit. And the state incentives are up to $2,000, $2,500 and $3,000 a vehicle and the time frame is a little bit different so read the paper.

The refueling infrastructure cost. The government provides ten percent. And I think this was persistent with what Mike said with respect to what is currently being seen in the CNG market. The higher growth case scenarios assume a bit more government subsidy of the infrastructure.

Now what do these sort of imply if these things happen with respect to how quickly do markets, vehicles enter the marketplace under the three scenarios.

I mentioned before that the number of vehicles in the vehicle stock on the road will end up plateauing at ten times, about ten times the annual sales rate. The industry assumed they would get to an annual sales rate and then just quit selling vehicles.

This was sort of a two-fold. The industry is willing to sell fuel but only, you know, but so much. But also of the target market you start running out of customers. There's only so many fleet vehicles out there.

Now what does this mean in terms of gasoline displacement? You're looking at -- Let's see, did I do the fuels one? Yes, number of GGEs displaced. Again, rapidly growing to about 2020. In about 2025 in the most aggressive case being able to displace about 400 million gasoline gallons equivalent of petroleum fuel.

Smaller amounts of course in the less aggressive scenario cases. About 270 in the moderate growth, or I guess what people have been calling the most likely scenario. And a little bit under, about 140 for the very conservative growth scenario.

What does this turn out with respect to the percentage of petroleum fuel displaced? I've shown that here on this slide growing to about 2.3 percent with the most aggressive scenario of the gasoline consumption displaced by propane.

These displacements sort of differ from what McKinley had. The percentages are comparable to what McKinley had but if you remember the previous slide in the GGEs there's sort of a disconnect. It's not very much but clearly I think McKinley is basing his fraction of displacement on a different fuel volume sale in a given year. One of the reasons for that is this is only looking at gasoline and I think the natural gas presentation looked at the total petroleum fuel.

But I think there is another underlying, somewhat differing assumptions with respect to whose projections you use with respect to not only the fuel cost, which is as murky as Commissioner Boyd pointed out, but with respect to how much is going to be sold in the state in a given year. So maybe we'll just argue about whose projection is the one to use.

This slide just summarizes the numbers

shown on the previous one. It just calls them out by the milestone years.

Showing again growing by about 2022 to the plateau. You know, the conservative case a little under a percent. The gasoline use in that year in 2022 can be displaced with propane fuels and vehicle fuel. Growing to 1.5 percent if you adopt the moderate scenario assumptions. And then just under two percent if you get aggressive and start having OEMs supply vehicles. And you have the assumptions that were used in the aggressive scenario case.

Of course everybody is asking cost and people are reporting costs on different bases today. What I have noted here is what these scenarios assume are government incentives or investments in buying down the vehicle price and contributing to the cost of an infrastructure.

And then below that take a look at what's the cost to the user of buying an LPG vehicle in a given year. And then how much is that user going to save in fuel costs given this 25 percent discount from petroleum fuel in that year. And it's all dollars per vehicle.

And you can show that even in 2012 you

could probably pay back even under the most conservative scenario the incremental cost of the vehicle in about a year and a half's worth of fuel savings. And clearly for all the other cases we get almost instantaneous fuel -- instantaneous cost recovery of the incremental cost of the vehicle that goes to the client or the customer with the fuel savings achieved.

I'm getting close. This is a look at the cost-effectiveness. And I'm using the same sort of definition that McKinley used in the natural gas presentation when we finally end up with a cost-effectiveness defined as dollars per gasoline gallon equivalent displaced.

It takes into account the capital costs of the vehicle and infrastructure. It looks at the fuel savings that accrue to use of the volumes of fuel assumed in the cases.

It looks at both federal and state tax duplications where a negative number means that the federal government is giving money back. It isn't spending. It's receiving more of the excise tax than it would normally do and the state is losing money on the proposition.

Anyway you end up with numbers now that

are in the 45 to $1 based on the scenario, cent per gallon, gasoline gallon equivalent.

And these are, you know. McKinley showed, you know, up to about 54 cents a gallon. These look a little more aggressive and I believe probably are the case because I don't believe the infrastructure costs are quite as great for an LPG station at a target marketplace.

So in summary -- I'm out of time in a minute so I'll be done in a minute.

Propane can achieve significant petroleum fuel displacements by 2022. Up to about two percent for our most aggressive growth scenario. A percent and a half for what people have been calling the moderate growth or most likely scenario.

The characteristics of these three scenarios are for business-as-usual or do nothing or conservative. Things essentially stay the same. You're only looking at fleet sales and it's a retrofit market.

For the intermediate case or moderate growth you get some more incentives. Your incentives about double for how much incentive the government is putting on average over the 43 year time period looked at here from 2008 to 2050.

The aggressive growth scenario assumes a bit more in government incentives of the vehicle and the infrastructure but now the OEMs are offering new vehicles. This allows acceptance to occur in the consumer market.

If a consumer has got a selection of vehicles, even an on-road, general population consumer in addition to the fleet user. If he's got a wider selection of vehicles he is more likely to accept a fuel.

You get favorable payback in essentially a year, about a year or less. By very quick time frames within the 2077 (sic) milestone years.

And the cost-effectiveness is favorable for all incentives and scenarios. And of course, it is more favorable the more aggressive you get with respect to how many vehicles you put on the road and how much fuel you are able to sell.

So with that I think I finished close to my target.

PRESIDING COMMISSIONER BOYD: Congratulations and thank you. (Laughter)

MR. OLSON: Okay, do we have comments from our panel here or people on the phone?

MS. GARLAND: We're going to try and set a standard for brevity.

PRESIDING COMMISSIONER BOYD: Please push the button there and get a green light.

MS. GARLAND: Sorry about that. I am Lesley Garland and I am with the Western Propane Gas Association. And we promise to be brief.

We'd like to thank, on behalf of the entire propane working group thank the Energy Commission and the Air Resources Board for including us in this process. We want to thank them for considering all of our comments through the months that have come and gone. We're extremely pleased with the outcome of the report. There are very few things that we have any comments on, which is I can be so brief.

Two items that we'd like, that I'd like to point out at the risk of beating a dead horse, our working group also had issues with the gas and diesel prices that were listed. The estimates I believe from EIA.

And the only other thing I'd like to point out is that we do have -- in the aggressive growth scenario there was reference to new OEM projects. We have got two, new, exciting projects that are hitting the roads this year. One is a Roush Ford F-150 pickup truck which we believe will be very big in the fleet market. And the second is a Bluebird Vision Series school bus, which they're already taking order for and we're hopeful that that will also bring more propane vehicles to California's roadways.

MR. MERCER: Rob Mercer, IMPCO Technologies. In reviewing the numbers that have come up there I do believe they are a little bit conservative if we look at, especially propane vehicles in the light duty market segment.

If we look at some of the other markets that we deal with with similar socioeconomic conditions such as Australia, a population there of 20 million people puts 100,000 new propane vehicles on the road each year. Twenty-five percent of that would be an OEM figure, the other 75 percent of those vehicles would be a retrofit activity. Varying levels of technology but they are all compliant with the European norms.

Which brings in another factor. We have a technology we'd love to introduce to the US market. We are doing so with the EPA in several states. It's good -- It's both for propane and natural gas light duty vehicles. The one problem we do have is we cannot pretend we can comply with on-board diagnostics to the level of using generic scan tools.

However, if we go with the European model and a step further forward, which we are prepared to do, we can guarantee the alternative fuel system will not provide an emission excursion. Therefore you will never see one of these vehicles at a repair center with a check engine light on due to the presence of our system.

You may see one of these vehicles at a repair center not running on the alternative fuel but that becomes a service issue for us. That will be my headache to deal with but not an emission excursion.

It does require a rethink but that allows us to go to any showroom platform vehicle and convert that vehicle to either natural gas or propane. And for the California market I would say that if there was a real crisis with gasoline right now you'd be in worse shape than any other state given the amount of alternative fuel vehicles that are on the roads.

It does give another offering and we'd

like ARB to consider, and are prepared to spend the money to prove out our concept as long as at the end of the journey they will let us put vehicles on the road in that manner. Thank you.

PRESIDING COMMISSIONER BOYD: Could I ask you what's the driver for the large percentage of vehicles in Australia.

MR. MERCER: The driver is cost savings for the fleet, it's all economics based. Recently the Australian government, because the cost of gasoline is going high, going higher, it's affecting the general public. The Australian government now has an eight year uncapped program of $2,000 for a retrofit gas system which they just provide to you on proof installation of the system. That's for families, that's not for fleet business. The fleet business is actually driven off good old economics. Price of fuel at the pump savings, and that's why they do it.

The government of course are looking at greenhouse gas emission reduction. And also the bigger issue today is energy security.

PRESIDING COMMISSIONER BOYD: And you have adequate supplies of propane available to keep it economically viable?

MR. MERCER: Australia is a net exporter of propane but believe it or not we do import propane from Singapore because of being told that it actually works out cheaper to bring it around the coast than through the center of the country.

Australia is also a big supplier of natural gas. Obviously it's looking to supply natural gas to California as one model and they get a lot of propane off the northwest shelf. So yes, Australia has a good, a balanced supply of propane.

PRESIDING COMMISSIONER BOYD: Thank you.

MR. OLSON: Okay, any of the panel members on the phone wish to comment?

MR. MEYERS: This is Bob Meyers with the Western Propane Gas Association. And I had just a couple of things, particularly in light of Rob Mercer's comments as well as Larry's comments with respect to the projections of being relatively conservative.

Propane has been used as a transportation fuel in California since the 1920s. And over that period of time, and probably since the last 25 years, we have seen a lot of the rah-rah associated with alternative fuels and the number of vehicles that were going to be on the road were going to range in the millions. We've been through almost every alternative fuel with the exception of corncobs about how vehicles are going to be displaced and we're running around.

None of that has happened. So we are conservative in our projections. We think it's realistic projections. And certainly depending upon the cost of fuels, the incentives that have been mentioned, we could double those or probably even triple those numbers.

However, the realism dictates that we're going to be petroleum based for a long time to come. Propane is a cousin of petroleum and a natural gas and so our conservativism is predicated on a long history of realism.

So with respect to infrastructure, which has dominated a lot of the conversation today. We think there's about 700 places in California today where you could refuel a vehicle and almost exclusively that has been provided by the private sector. Part of that is because the infrastructure costs on a per site basis are relatively modest and the aggressiveness of propane marketers is that they want to corner that kind of a market.

So the infrastructure issue that has been facing a lot of the other fuels in our discussions today is really not a big issue. It needs to be addressed but we think that the infrastructure will grow in response to the increased demand for the vehicles.

So that's my comments and I'd be happy to answer any questions.

MR. OLSON: Any other panel members on the phone who would like to comment?

MR. FEEHAN: Yes, hello, this is Brian Feehan with the Propane Education Research Council. I'd just like to add a couple of quick comments really building on the case.

As Rob Mercer talked a little bit about Australia, in effect worldwide we've got just over ten million vehicles that operate on propane. So we have many successful markets around the world and they are, they can point back to a couple of different factors.

One clearly is the price of conventional fuels. Two is the fiscal and non-fiscal incentives and long-term policy decisions and discussions that governments put in place. And three, the other driving factor is the environmental regulations that we all face, especially in California and the rest of the United States for that matter. So we think that in today's position propane certainly has a great role to play in helping decrease our dependance on foreign oil and cleaning up the environment.

And our industry itself I think has begun to recognize the true role that we can play as an industry and that's why our organization, PERC, has invested several million dollars in developing some of the new platforms. And when I say several million dollars I'm talking about profit or industry investment alone and without any government support.

And Lesley touched on it briefly with the new propane Vision school bus from Bluebird as well as the Roush F-150 as well as the conversion companies or aftermarket companies that are out there that are still certifying equipment at a considerable expense on their own behalf because they do see an opportunity for market growth.

So I think that the industry is collectively behind this initiative now. They have demonstrated that through infrastructure growth and they have certainly demonstrated that through investments in new technology. And we appreciate the opportunity to be here and support California in this initiative.

MR. OLSON: Any other comments on the phone?

MR. BATES: Real briefly. This is Eric Bates with Ferrell Gas & Propane just to follow up. Brian just said the money that PERC has invested in some of our newer technologies.

A gentleman earlier, I believe it was Mike Jackson was talking about some of the off-road applications and propane plays a big part in keeping our environment clean on the off-road stuff too. There's literally thousands of forklifts. Some of the new technologies, several lawn mower manufacturers are going to propane. So some of that impact doesn't affect the on-road but the off-road sure makes a big difference as well.

MR. OLSON: Other comments on the phone?

MR. PLATZ: Yes, my name is Bill Platz. I guess between Eric and I we represent the propane companies that are actually trying to put vehicles on the streets and build that infrastructure that Bob Meyers indicated earlier.

I represent a company called Delta Liquid Energy and we worked with the group the whole time.

Just a couple of quick comments. To clarify Bob Meyers' comment just a little bit. We're always willing to put out infrastructure on our own dime in order to fulfill a private fleet requirement for using propane.

When you start talking though about public access infrastructure those costs start to go up quite exponentially when you involve card readers and larger storage at gasoline stations. Those costs do start to increase. We've been able to take advantage of a few DOE grants along the way to be able to help put that infrastructure in place and we're thankful for that.

The other thing that I would like to echo a little bit about Mercer's comments. The guys that are out there doing the fleet conversions today on an aftermarket basis are quite willing to go through the hoops at EPA, spend the money, again out of their own pocket. They're able to build a business case for selling a kit into 49 states.

And they to a person, and maybe Bob Mercer would tend to decline this a little bit, but to a person most of those small market members are small businessman who are saying, why should I spend an extra dime going to the extra hoops that CARB requires for a vehicle conversion when I could sell as many kits as I can manufacture today in the other 49 states.

So those of us that are trying to sell propane as an engine fuel out here in California are starving for the ability to get vehicles to the marketplace. And while we have some vehicles coming through the work of PERC it is really not enough to help support that growth of infrastructure.

So it's a chicken and egg thing that needs to be addressed to a point where we can get some more vehicles out there in the marketplace (inaudible).

MR. OLSON: Okay, other comments on the phone? Are there comments, questions or comments from the audience here? Dave Smith.

PRESIDING COMMISSIONER BOYD: Dave Smith hovering in the back there.

MR. SMITH: Maybe I should just get on the phone. (Laughter)

Larry, again, BP is a major producer of

LPG in California. The point that could be made for LPG and all the alternative fuels is there is an issue about fuel quality. And when we produce our LPG we make sure that it meets the ARB standards for motor vehicles. But when it gets into the marketplace in many cases, or in some cases, that quality is degraded because it gets mixed with commercial propane and we don't have control over that.

So as you look at this fuel and all other fuels alternatively there needs to be a recognition that the same level of enforcement and oversight that ARB gives gasoline and diesel also need to be given to the alternative fuels or any of the renewable fuels in fact, biodiesel or what have you, to ensure that you actually achieve the emission reductions that you think you're going to get.

And also from our perspective it provides a level playing field. Those are, you know, classic terms, and it provides us an incentive to continue producing fuel that meets the requirements. Thanks.

PRESIDING COMMISSIONER BOYD: Dave, don't leave the podium. I want to ask a question of anybody and you may want to respond. And that's about, let's say here in California we were able to clear a lot of the hurdles that have been indicated stand in the way of expanding the vehicle use of propane. Can we supply an increased demand? Can we meet an increased demand for supplies of propane in the state were we to be able to increase the fleet out there that uses propane?

And I'm saying that because of the experience we had this winter with the unseasonably cold weather. I mean, we were just about on the edge, we were almost operating on an emergency fuel basis here at the Energy Commission trying to find propane all over the country to bring it in here for our agricultural community just to power the engines that they use with their wind machines and what have you.

So I get a little concerned about the ability to fuel much more in the way of a propane fleet. At a cost. And still maintain a cost differential that makes it so positive.

MR. SMITH: You know, that's an excellent question, not only for propane but for probably a number of the other fuels being considered. That some of these fuels are used in multiple sectors. You know, as you see increased demand for them in the transportation sector it will have impacts or vice versa.

You know, obviously I can't say, answer your question in a public setting as to what we could do or couldn't do. Bit I think you can look at the marketplace and suggest that the marketplace will react to signals that it gets. It is a chicken and the egg thing. But presumably if there was a market for LPG people would look at that and determine if it's feasible for them to get into it.

The home heating area and whether we have, you know, variations in temperature is a real, a real concern. You could raise that with natural gas to I suppose when you get to those marginal standard cubic feet and where you are going to, where are you going to use them.

I know I am not answering your question, sir, but I can't and I don't know that anybody can. But, you know, I would hope that the market would be efficient and would respond to the demand.

MS. GARLAND: I might be able to take

another whack at the pi¤ata with that one. The Western Propane Gas Association, after January's freeze we formed a task force of our marketers and suppliers and transportation providers to analyze what happened and to analyze what we could do better as an industry when or if this happened again.

And we came to the conclusion that a lot of what happened was the domino effect. There were so many factors that fell into place in a perfect storm, as you might say, and we realized that there are a lot of things we can do as an industry to improve our position. Increasing the amount of storage that we have, both with our customers and as companies. But that, of course, that's, you know, we have bureaucratic hurdles we have to face any time we put in additional storage in the state.

But I think again it's the chicken and the egg. As this industry, as the transportation sector grows that's a year-round load. And that is something that we can prepare for knowing that every day there are going to be so many cars or trucks that are going to need so many gallons and they can prepare for that accordingly. But when it comes to a record-breaking freeze. That's one of those things where, you know, We've got to pray that we can be ready for it.

PRESIDING COMMISSIONER BOYD: Thank you.

MR. MEYERS: This is Bob Meyers. I'll just add 30 seconds on top of that.

The California market is supplied not only from indigenous crude oil and natural gas reduction but traditionally supplies are railed in from Canada, from Alberta principally, from the mid-continent area, from West Texas and from the Gulf Coast. Historically that's happened. It has for the last 50 years because the demand is about three times in the winter from what the demand is in the summertime.

As a consequence it's an industry that is greatly dependant upon logistics and transportation. And if we saw this market expanding that infrastructure and transportation will increase, principally because it's a year-round load. It isn't something that is winter sensitive. That the engine fuel market is something that can very well be planned for.

But there's no question that we would need more storage to do that. I mean, it's the crude oil. We greatly depend upon imported crude oil, ethanol, natural gas. We're looking at LNG terminals for imported stuff here. We are a state is greatly dependant upon imported supplies. The propane industry will respond to that as it has in the past and this engine fuel market would give us the encouragement to do that.

MR. OLSON: Okay. Commissioners, we are at a point where this is our lunch hour. I would recommend we break for what we proposed, an hour. We are behind schedule. I have asked our speakers to shorten their presentations. I am not sure if we are going to be able to catch up everything we've lost here in terms of time.

PRESIDING COMMISSIONER BOYD: Well the staff will have to take up a collection for pizza if we go past too late tonight (laughter).

MR. OLSON: Okay, shall we break for an hour then and come back?

PRESIDING COMMISSIONER BOYD: Yes, let's break for one hour. Please try to be back in an hour. So walk fast to lunch and back.

(Whereupon, the lunch recess was taken.)

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AFTERNOON SESSION

MR. OLSON: We'd like to start our panel sessions again. This next one will be on the hydrogen vehicle, fuel and vehicles presentation by Matt Hooks of TIAX and the panel that we had talked about that could come up to the table up there. I think some will be straggling in here. So Matt Hooks, go ahead and give your presentation. Thanks a lot.

MR. HOOKS: Great, thank you. I will hopefully try and maintain an appropriate pace for this afternoon. I am going to be talking briefly about hydrogen vehicle implementation and the associated hydrogen fuel use. Thank you.

Going through the methodology. The consumption benefits and implementation were estimated by using a variety of sources including stakeholder interviews, publications and a variety of data sources produced by a variety of California agencies on which we relied heavily, including the Hydrogen Highway Network Blueprint Plan, the IEPR report of 2005, the Low-carbon Fuel Standard and the ZEV Technology Review recently released by the EPA and the ARB.

I'd like to talk briefly about the focus of this analysis. We looked specifically at the deployment of hydrogen fuel cell vehicles, particularly light duty vehicles, due to the significant investment and benefits of fuel cell vehicles. Many OEMs see fuel cell vehicles as the ultimate solution to reducing criteria pollutants and climate change emissions.

There are numerous performance advantages over hydrogen ICEs including improved efficiency, zero emissions and the ability to utilize an all-electric vehicle platform.

Recently the federal government has committed over a billion dollars to date to help develop fuel cell vehicles as well as the majority of auto manufacturers are investing heavily in fuel cell vehicle development and technology. I believe that this indicates a commitment to fuel cell vehicles being a significant transportation mechanism in the future.

But most importantly, the ability to successfully deploy hydrogen fuel cell vehicles is a key to achieving significant hydrogen market share in California and the US.

Just to briefly go over the methodology used. We projected vehicle penetrations for two scenarios, a business-as-usual growth scenario as well as an aggressive growth scenario.

The feasibility of these growth scenarios were verified using hybrid electric vehicle sales growth as a measure for fuel cell vehicle growth potential in the market, given the success of the implementation of hydro-electric vehicles.

We then were outlining the potential barriers to the implementation and determining the cost to overcome those barriers.

The potential gasoline reductions were calculated in comparison to competitive vehicles including standard gasoline vehicles, Pavley-compliant gasoline ICEs as well as PHEVs, which will offer similar incentives and benefits.

We illustrated the relative ability of fuel cell vehicles to reduce GHG emissions, estimated infrastructure costs and outlined actions necessary to overcome barriers to implementation.

Moving on to barriers. It's important to note that hydrogen fuel cell vehicles are somewhat unique relative to a lot of the other fuels and vehicle technologies that we're looking at in that there are a large number of technical hurdles that must be overcome before hydrogen vehicles can be implemented into the marketplace.

Most of the implementation will come in years, the outlying years of this study in the 2022, 2030, 2050 cases where there is considerable uncertainty for a variety of the metrics used to calculate all of the benefits and costs of hydrogen vehicles.

But to briefly outline the technical barriers that are impeding the commercialization of hydrogen fuel cell vehicles. The first is on-board hydrogen storage. Which as stated in the ZEV Review, "the cost, weight, and volume of hydrogen storage remain major barriers to commercialization."

Clearly as shown here the volumetric energy density of hydrogen makes it difficult to store the required energy on-board the vehicle.

It's believed or assumed by the OEMs that any commercialized vehicle for commercialization will be required to have a 300 mile range, which sets minimum standards for on-board storage requirements.

In the near term OEMs are intending to

use compressed hydrogen storage to fulfill these energy storage requirements as opposed to liquid storage for complexity and energy reasons. There are problems associated with the temperatures of liquid storage as well as the energy required to liquify hydrogen, which can make the GHG and energy reduction benefits less prevalent when using liquid hydrogen.

Research is continuing into alternative storage techniques that may improve the gravimetric and/or volumetric energy density of hydrogen storage. Such options include metal or chemical hydrides and activated carbon structures. Unfortunately this is still very much in the research and development stage and it is too early to make predictions about the performance of these alternative storage techniques and their costs. So for the present analysis we are looking at the costs and performance of compressed hydrogen storage.

Automotive fuel cells are also a significant hurdle to the commercialization of FCVs. Most fuel cell developers concur that there are improvements required in the power density of membrane electrolyte assemblies, catalyst loading and associated costs, the operating lifetime of fuel cells as well as allowing them to operate over a wider temperature range.

So clearly before there can be any significant market penetration there are a number of hurdles that need to be simultaneously overcome to allow that to happen.

The time to meet these requirements varies depending on who you talk to. There are a lot of statements from OEMs and fuel cell developers that state that they'll be ready to commercialize these technologies anywhere between the 2010 and 2020 time frame with varying units of volume of production between 100,000 and 250,000 units per year.

The ZEV Review Panel remains cautiously optimistic that there can be commercialization achieved in five to ten years.

The R&D costs are relatively unknown due to the private investment in many of these technologies but will likely need to continue at the present rate or increase. Some indicators are the Hydrogen Fuel Initiative funded by the federal government that has spent over $1 billion between 2003 and 2008, which could be assumed to be probably a 50/50 cost share with industry. So investment is in the multi-billion dollars on these technologies.

As you can see here in the chart there are present status and forecasted goals. As you can see all of them are a ways away from being ready to meet the goals or even the forecasted status.

One of the final and major barriers to implementation of fuel cell vehicles is fuel production and infrastructure. Hydrogen is presently produced in significant quantities in the United States for use by the oil industry for hydrotreating in the refining process. This domestic production is approximately nine billion kilograms annually.

Despite that there is a lack of fueling infrastructure and distribution. That would be a major barrier to implementation.

Again, as we have seen before, this is sort of the classic chicken and egg problem that requires proactive action, whether there is going to be a infrastructure before vehicles or vehicles before infrastructure. California has begun demonstrating such action with the development of the California Hydrogen Highway Network Plan, which is designed to serve 20,000 vehicles at 250 stations by the point of completion.

Numerous efforts are underway to determine optimum development of larger hydrogen infrastructures. However, it is relatively unclear how government and industry will interact to build these infrastructures.

And the final comment about fuel production is that hydrogen will be able to produce either on-site at fueling stations using technologies like steam methane reformation or electrolysis or at central plants where technologies such as steam methane reformation or gasification of coal, biomass or other feed stocks is plausible and then it can be distributed by truck or pipeline.

Again I just sort of -- in follow-up on that is really stress the importance of these barriers and the significance to overcome them to commercialization. The time frame is relatively unknown as is the cost. And all of those problems will need to be answered before there can be any significant launch point, as Mike Jackson referred to earlier, in the fuel cell vehicle industry.

But there is significant investment in it and as we'll see there are significant benefits that will be received if we can make it to that point.

I'm going to go through some of the assumptions. For vehicle penetration, penetration projections are based on estimates of commercialization milestones for two growth scenarios. As I said, business-as-usual and the aggressive scenario.

The business-as-usual growth was based on milestones specified in the ZEV Tech Review for a variety of technology status that are shown in the chart below, demonstration, pre-commercial, low-volume commercial, mass-commercialization, for two scenarios. The ZEV Review predicts total fuel cell vehicle production at 10,000 vehicles a year in 2020, of which we assume ten percent of those will be sold into the California market. This is again, the business-as-usual scenario.

In an aggressive growth scenario it was based on the California sales estimates specified in the Low-carbon Fuel Standard documentation for their electric drive scenario. This predicts 2020 California fuel cell vehicle sales to be on the order of 200,000 vehicles per year so a significant market increase from the business-as-usual.

In terms of vehicle development the further development of fuel cell vehicle components can reduce the incremental vehicle costs, but up-front costs will not be competitive with ICE vehicles.

Compressed hydrogen storage, as I said, was a problem. It may be able -- It is estimated to meet intermediate DOE weight targets but unlikely to meet long-term weight goals or any DOE cost goals.

In the absence of major breakthroughs it is estimated that significant cost reductions for compressed hydrogen storage are not anticipated below the present costs. So for a five kilogram tank, which is sufficient for a 300 mile range, assuming a 60 miles per kilogram efficiency, is assumed to be in the order of $1600 per tank. Which when compared to a gasoline tank assumed to be $100 is a significant incremental increase.

Development of hydrogen fuel cells and achievement of the minimum costs predicted by the ZEV Review panel can potentially reduce the power plant incremental cost on the order of $1200.

These are all costs associated with high volume production with estimates between 100,000 units per year or 250,000 units per year. There will be higher incremental costs in the transition period but those again are hard to quantify.

Additional incremental costs are associated with the use of an electric drivetrain based on known costs of HEV drivetrains.

Estimates of incremental vehicle costs are shown next to a variety of competitive vehicles including HEVs, PHEV 20s and PHEV 40s. As you can see there is going to be significant incremental costs between a low case of $6,000 to a high case of $10,000 over a standard gasoline ICE. While significant they are somewhat comparable in magnitude to the incremental costs of other technologies that may need to be implemented to meet regulatory goals in the future.

In terms of infrastructure development it was assumed that the infrastructure costs are based on the near-term on California Hydrogen Highway assumptions and in the future on the construction of large on-site SMR stations.

The California Hydrogen Highway predicts the total cost of $160 million to develop infrastructure necessary to serve 20,000 fuel cell vehicles in major metropolitan areas.

This cost is split between vehicle incentives but primarily for infrastructure development which will be cost-shared for industry. The costs are spread over the time required to achieve the vehicle penetrations for each phase.

So as you can see the Hydrogen Highway has three phases of which there's vehicle populations of 2,000, 10,000 and 20,000 vehicles at a peak station of 250. Those costs are spread over the different years segments shown in the business-as-usual and the aggressive growth case.

Future infrastructure estimates are based on the H2A costs for 1,500 kilogram a day on-site steam methane reformation stations where the capital cost is approximately $3.2 million estimated, serving over 2,000 vehicles per station.

Fuel costs were not considered in the overall cost of fuel cell vehicle implementation due to the large price uncertainty for gasoline as well as hydrogen in the transitional period.

Shown here are low and high cost estimates from the AEO 2000 (sic), which will obviously show wildly divergent costs for gasoline. It's also unknown what the hydrogen costs will be in a transition period or even how the hydrogen costs will change in the outlying years.

But it is somewhat evident that hydrogen may be, may allow consumers to have fuel savings but it is relatively difficult to define in the long-term scenarios so it is not considered in a cost-effectiveness metric. Moving on.

Looking at some of the projections that were made using these assumptions. In the two scenarios the hydrogen fuel cell vehicle penetrations are vastly different, from one percent of the LDV vehicle market in 2050 to 21 percent in 2054, the aggressive case.

As you can see the business-as-usual growth will clearly not be sufficient to achieve a significant fraction of the California fuel market by the AB 1007 milestone years of 2020 and 2030. Using the aggressive case we may be able to make significant inroads in that time frame.

Vehicle sales here are shown for the aggressive and business-as-usual case as well as the HEV vehicle sales market segments for the first seven years of their deployment, shifted to sort of start at the 10,000 vehicle period for the aggressive case. What this shows is that the market share in California will have to be greater than the sort of national average of ATV market shares, assuming sort of a same production ratio.

This will probably require that there be preferential deployment of fuel cell vehicles into California, which will allow for a higher market share of 6.1 percent after a seven year growth period as opposed to sort of the national HEV sales growth of 2.3 percent.

If the national average was to be 6.1 percent of fuel cell vehicle sales for a seven year period the production ramp-up for HEVs would have to be significantly greater than what's happened in the HEV market over the first seven years. So maintaining a similar production rate would be difficult without preferential deployment.

In terms of overall hydrogen production. The US production is nine billion gallons in 2007. It would be required in 2050, the hydrogen production would only be 2.3 billion. However, consumption for these vehicle penetrations would be 0.1 and 2.3 so well within the production realm or possibility given our present production.

Quickly moving through the potential gasoline reduction. Here we're looking at the potential gasoline reduction for the aggressive case relative to PHEVs. You can clearly see that there is a significant benefit to fuel cell vehicles over PHEV 20s and PHEV 40s due to the fact that there is no gasoline use at all in the fuel cell vehicles. But there are in the outlying years significant overall avoided gasoline consumption from the implementation of fuel cell vehicles.

GHG reductions are highly dependent on the ability of hydrogen to be produced from multiple feed stocks. As you can see here there are a variety of renewable and non-renewable feed stocks for hydrogen that are almost all of them preferable to the GHG emissions of advanced or standard gasoline vehicles and are competitive with PHEVs. But it's clearly, in the last slide, the advantage of fuel cell vehicles over PHEVs and gasoline petroleum reduction as opposed to GHG reduction.

Total annual costs are tied very closely with the annual vehicle sales of fuel cell vehicles given that in the assumption the cost is assumed fixed once mass production is reached. Again, the cost of fuel cell vehicles in the out years are relatively unknown and hard to quantify so it's difficult to believe these numbers exactly. We even only show the cost numbers to 2025 due to the increasing level of uncertainty in the vehicle costs two decades in the future.

As you can see here is a breakdown of those costs. The majority of that is driven by vehicle sales, incremental vehicle costs as opposed to infrastructure development, which is shown on the bottom line. The cost dip shows the period in which the California Hydrogen Highway is undergoing a period of little construction but increasing utilization.

Finally there are a number of vehicle attributes that need to be considered when deploying a car with significant incremental vehicle costs. First the adoption of non-fossil, low-carbon fuels produced from a variety of feed stocks frees the consumer from the price volatility of fossil fuels. This also benefits manufacturers by decoupling the viability of their future business from the volatile fuel markets.

Fuel cell vehicles also benefit from the possibility of home refueling. In addition to that some firms are developing home energy stations that are suggesting the tri-generation of hydrogen, electricity and heat, which can really tie your fuel cell vehicle into all the other energy needs of your home and provide multi-faceted energy and cost benefits.

Also the ability to remove the ICE from the vehicle allows OEMs to offer new and unique vehicle platforms which may make vehicles more attractive to consumers.

And such practical benefits as admission to California HOV lanes, which is restricted to, may be restricted to ZEVs, would be a vehicle attribute that would be favorable.

In summary as I said before, there are many technical barriers impeding fuel cell vehicle commercialization but they promise some significant petroleum reduction, GHG benefits and vehicle advancement. Improvements are required in hydrogen storage, automotive fuel cells and hydrogen infrastructure.

In the short term the most important actions are to continue or increase the funding for R&D as well as a sustained effort to help develop a hydrogen infrastructure.

In the long term there will need to be further reductions in incremental vehicle costs or methods to incent consumers to purchase fuel cell vehicles.

The aggressive deployment of fuel cell vehicles will provide GHG benefits determined by upstream emission of the feed stock and significant petroleum reductions. The monetization of these petroleum reductions in the form of tax credits or similar incentives will be particularly beneficial to hydrogen vehicles. And financial incentives for GHG reductions will promote the adoption and utilization of more low-carbon fuel sources.

How did I do?

MR. OLSON: Very good.

MR. HOOKS: Under time?

MR. OLSON: Don't go away.

PRESIDING COMMISSIONER BOYD: And to think it's not even lunchtime yet.

(Laughter.)

MR. OLSON: We have some people here on a panel, Gerhard Achtelik of the California Air Resources Board, Christopher Yang from UC Davis. And Erin Bright is on the phone over there in the corner. Erin, do you have anybody on the phone?

MS. BRIGHT: Steve Ellis from Honda.

MR. OLSON: Steve Ellis from American Honda. Do any of the panel members have comments, questions, insights?

DR. YANG: Sure, I've got some questions, comments. Christopher Yang, UC Davis. I am also here representing Joan Ogden who couldn't make it today. So we wanted to first just complement the research team on the balanced approach that you took with addressing both the barriers for infrastructure in fuel cell development as well as, I think, the optimism that's within the community on looking at hydrogen fuel cell vehicles.

A couple of things that I wanted to mention. First, it seemed like there was maybe an over-reliance on a few studies within California and less on some of the -- there's a lot of DOE work that's out there that I think could be quite useful, the Freedom Car Review as well as some of the transition analyses that the DOE has done. Oak Ridge National Lab and also NREL in some of the fuel cell vehicle reviews. So those are things that I think could be improved upon.

I think one of the other things with respect to the cost. You sort of picked a $2 to $4 fuel range and that's certainly something that I think could be improved upon as well. A lot of the work that we've done at UC Davis on infrastructure analysis really show that, you know, it's very much a region and sort of geography specific, the infrastructure analysis, infrastructure costs. So kind of early on it's most likely going to be much higher than the $2 to $4 range. But certainly in the long term that does seem reasonable.

Some of the other things have to do with I think the challenge. I can't remember what the bill is but the hydrogen highway bill. Looking at a certain percentage of renewables for hydrogen in California. I think there's going to be some challenges getting costs to that level given the requirements for renewable fuels to be used as a hydrogen feed stock.

So the near-term, low-cost feed stock

would be natural gas. And kind of the challenge of integrating renewables in to that and still achieving low cost I think will be, is another important thing to point out. That might be all I have to say for now.

MR. OLSON: Any other comments?

MR. ACHTELIK: Gerhard Achtelik with the Air Resources Board and I just want to echo Christopher's comments about, you know, recognizing TIAX for the job they did in compiling these different sources. The bill you referenced, I think it's 1505. That's where the requirements are for both renewables and greenhouse gas reductions a minimum of 30 percent. Greenhouse gas reduction triggers off the amount produced.

I guess while there definitely will be an initial cost, I guess, using the renewables, but then there is also the potential of providing the greenhouse gas benefits. Those are the only things I wanted to add to that but thanks.

DR. YANG: I'm sorry, one last thing. I noticed in the, at least in the report you referenced the low-carbon fuel standard as a UC Berkeley project. And I'll just add that it's also a UC Davis project as well.

(Laughter.)

MR. HOOKS: My mistake, I apologize.

MR. OLSON: Any comments on the phone?

MR. ELLIS: Yes, Steve Ellis with American Honda. I want to make sure, you can hear me okay?

MR. HOOKS: Yes.

MR. OLSON: Yes we can.

MR. ELLIS: Okay, great. Similarly I'd like to compliment the team on putting this document together. They worked hard on all these challenging assumptions and scenarios. It's an excellent platform, an excellent kind of starting point. I wanted to provide just a few comments, I'll try to keep it very brief. And then I'll take leave to create and to provide maybe more comprehensive backup written comments that I think would also help you.

First of all I think there are some guiding principles that I wanted to make a point of. And some people may have felt that I myself at American Honda have been one to try to make sure that there's a correlation drawn between other alternative technologies, specifically some of the electric drives, and standard gas vehicles and their role, how they interact together, with the efforts and everything to do with hydrogen and fuel cell vehicles.

So I think a report like this is challenged to try to capture those points. So how do you put value on the efforts of this report and say in it what would natural gas vehicles and fuel bear and how it can impact what these matters are for hydrogen fuel cell.

So there's all the examples that people hear of, very often which is the hardware side. Some of that being the storage, the tanks, the infrastructure, things like that.

There's also, just to point out again, the consumer habits, the softer side. So people that have experience with one technology (inaudible). So there's values beyond just the economic or just the environmental value. So I wanted to put that out as almost a guiding principle.

Other comments on some of the references to barriers where maybe it's too broad of a brush stroke. I'll give a couple of examples. Where a barrier is described as fuel storage and also in the same context of the fuel (inaudible).

And yet in reality we have almost an -- there's a certain maturity to vehicle fuel storage while holding out for greater events. We are already achieving range levels that were not expected this early along at this point. This range is like where the next generation of cars, that 270 miles (inaudible).

But one example where I wouldn't call that a barrier, just more of a hurdle, but yet, you know, a barrier or hurdle for the staff. I think that's fair.

Just a second. I apologize for the delay. Also on the technology side the scenario based on the (inaudible) model may be most appropriate. Some of the points are similar when it's (inaudible) delivery method. So I think as it relates to natural gas as a feed stock there's differences in delivery methods that may need to be captured. For example pipelines versus delivered fuel.

The other fact that I think is the fact that there's a lot of renewable energy that can be put into the equation even when you consider this. The natural gas model could include biogas I suppose.

Moving on to kind of the vehicle cost estimate. It may be too high. I think the most important thing is to show that we're making significant advances in cost reduction of the vehicle. Maybe that hasn't been communicated well. But from the '08 to 2017 window and going forward from there maybe the high (inaudible).

The efficiency side. We think that maybe there's room for improvement there. Maybe it's showing the energy (inaudible). We would offer that it's closer to 2.4 or 2.5. And that's using our current vehicle which is certified at 57 miles per gallon combined after we adjust it. And if the test day value is used, which it should be, that would already be at 2.4 or 2.5. So we're making rapid progress there.

And maybe that's not reflected in the report and would underestimate the benefit and the next generation car will be much better given the fact that we're already demonstrating 50 percent efficiency.

So then I think, again I think there's other references to the acceptance of vehicles relevant to the range and maybe assumptions of the need for (inaudible). So I just want to point out again that we're looking at what range, you know, does provide good customer acceptance in the early stage versus when it's more relevant or larger in the outer years.

So we're not of the minds that we have to rely so heavily on the more challenging 700 (inaudible) to accomplish this goal. And again society (inaudible) at 270 miles as I indicated.

So that's it for now and then like I said we'll provide written comments on that. If you have any questions.

MR. HOOKS: Thanks for those comments, Steve. And I'll talk to you off-line for all the questions if they're relevant here.

MR. ELLIS: Okay.

MR. HOOKS: In the name of time.

PRESIDING COMMISSIONER BOYD: Okay, is there anyone else on the phone?

Any questions of any folks or from the people up here?

MR. OLSON: All right, thank you very much for the presentation and your insights, to the panel. We would like to now go to -- Are there questions? I guess not.

Now we would like to go to the next

presentation, which will be Gary Yowell from the California Energy Commission. He will actually do two, two different presentations, one after another, first on renewable diesel. And the panel members or the people on the phone, please come up to the table if you're here in the room and be available on the phone.

MR. YOWELL: Thank you, Tim. Good afternoon. It's good to see everyone survived lunch and survived this morning. I'll be brief. Okay, here we go.

In doing the scenario analyses for those fuels that were just shown the key issues that we discovered were the diesel price demand, the diesel demand and the crude oil prices that will affect the renewable diesel supply and the volume and timing of these fuels.

This has become a very complex issue dealing with imported, international prices of commodity fuels that would serve the biodiesel and the NERD fuels. NERD is non esterified renewable diesel, which was that big word there. Sorry.

CHAIRPERSON PFANNENSTIEL: Thanks, Gary.

PRESIDING COMMISSIONER BOYD: That's a first, Gary.

MR. YOWELL: I hate that word. But that was the official EPA word that they're using at this point.

The domestics. I looked at domestics, I looked at imports. I looked at unconventional fuel sources, the algae, the biomass, the liquid, and the thermal depolymerization. Which can be determined -- Tyson is one genre, as well as the changing world technology which actually uses more raw turkey guts and stuff to make oils out of.

Looked at the incentives and mandates and effect on increasing volumes at various levels.

This is to show that California's fuel demand is strong and steady for gas and diesel. Focusing in on the diesel demand specifically, which is the part of the renewable fuels we see that this supply -- this demand forecast. The yellow is the Commission's base forecast for IEPR, including the greenhouse gases. The aqua is the additional component of off-road diesel at 30 percent additional demand. And the blue is the what-if. It's the maximum case. What if European diesel cars took off like they did in Europe as a maximum sensitivity study. It wasn't part of the major evaluation though.

What this growth in demand shows is an opportunity for alternative fuel to displace. In fact by 2050 you could actually displace up to 60 percent of current, of future demand and still maintain current refining levels or maxed out refining capacity. Now I don't anticipate renewable diesels or XTL diesels to solve this entire problem but maybe they could cut it in half. So I looked at renewable diesels displacing up to three billion gallons typically or 30 percent displacement.

I looked at renewable diesels in this crude oil price scenario, which is the fundamental price scenarios that we're using for all AB 1007, extrapolated out to 2050. Now what this represents at the pump is, are these prices here. To show you a context of diesel prices since 1918 to today's prices and future forecasts. And people made mention these morning about these prices, even the high being fairly low.

But I checked with our fuels office this morning and had them generate this graph for me. This is to illustrate a constant that we're dealing with. The fuel prices, this is on a 12 month average, this is how the price of gasoline has occurred in Sacramento. It had hills and valleys. You remember times when gasoline was $3.40 or $3.50 a gallon but there were also valleys when around Christmas it was around $2.40. on average it's about $3 a gallon. And that's what we're working with, it's on an average basis. We don't capture all these hills and valleys.

Another component of our prices is using nominal, we're using 2007 dollars. And if you look at the blue line, which is our high price reference point, it goes up to almost $4 a gallon by 2030. But in nominal dollars it is actually about $6 a gallon. Those are things that might obscure our prices and make them look lower than they actually are.

Moving back to the presentation. Looking at renewable diesel. What are the supply options for meeting future demand. Here is the world production of oil seeds, about 387 million metric tons. Now these are already serving food and cosmetic markets and other purposes. But growing an additional three billion gallons would be a very modest growth for this supply. But California is not an island and there's other nations and countries doing the same thing we're going after so that complexes this considerably and creates a big uncertainty.

Looking at a nearby source. Palm is about, there's only a two percent on this graph here but palm is a nearby neighbor. Palm production from sources from Malaysia, Indonesia and other countries. In fact we're getting a pretty good fraction of our bio-oils today from these sources. And right now it's at nine billion gallons and growing fairly strong. But these too predominately go to foods and cosmetics and is expanding out into the fuels arena.

Another illustration of supply. Biodiesel trends for Europe, Germany. USA in yellow and then California. I have great confidence in California's demand projected up to 2008. Everything after that was just speculative. That's a 20 percent penetration trajectory just to show you an illustration. Which is the midpoint of the analysis that we're looking at.

Greenhouse gas reductions. I believe TIAX has finalized on a biodiesel greenhouse gas reduction of about 50 percent on a life cycle basis. I don't think we have the renewable diesel finished. EPA I believe adopted a 70 percent greenhouse gas reduction. And that's predominately due to the higher energy content of the fuel. And biomass-to-liquid, I don't know if we have that finished but that is 70 to 85 percent greenhouse gas reduction based on the European life cycle studies. Hopefully that will be done fairly quickly.

What this could mean in a low-carbon fuel standard world is ten percent reduced intensity would compel a B20 biodiesel blend or a 15 percent NERD blend as a compliance measure, if that was the way it was to go.

Scenario analysis. Looked at a baseline scenario analysis of biodiesel reaching a two to six percent biodiesel use in California without extending any more research into other technologies and using existing federal incentives.

We have a second baseline because the low-carbon fuel standard that came in play in the middle of the stream on us so there I'm looking at maybe a 15 percent renewable diesel fuel could be envisioned as a low-carbon fuel standard compliance measure. And biodiesel to B5 is possible as well as up to B20, presuming the ASTM adopts their B20 standard.

In the alternative scenarios we're looking at ways to expand that beyond the five percent nominal range and into looking at state incentives on a per gallon basis of these amounts. Or if they weren't incentivized maybe they would be mandated. The market would experience these higher fuel prices on a per gallon basis.

And then looking at various incentives for R&D that might help pull the unconventional processes like algae and biomass-to-liquids. And construction incentives and stuff of that nature.

The bottom line came down to this chart. We have three fuel prices that we're looking at. We have existing federal incentives and varying higher incentives at the state level to pull higher volumes of California petroleum displacement, which is shown in the gray area here, these percentages. What this shows is one is in the reference price we're expecting up to a five percent biodiesel or renewable diesel displacement over a long, 20 year period of time with the markets maturing and stabilizing. And then these incentives would help graduate it to a higher level. And that's what we modeled.

And this is what the volumes, the percent volumes would translate into real gallons in California's time sequence. From this graph here, this is just percent of California demand. This is what they need at what period of time.

We developed a model that was used for the XTLs and for the renewable diesels that was specifically designed for the AB 1007 criteria. It's based on the projected future diesel demand and percentage of XTL or renewable diesel supply. The model captures consumer costs, government tax revenues, fuel prices, energy impacts based on the BT basis of the fuel. And it quantifies the petroleum reduction -- emissions reduction cost-effectiveness all the way out to the year 2050. And it's available if you want to see that.

This is just an illustration of one of the outputs that a 20 percent renewable blend at $1 a gallon additional cost. And you can see here the cumulative years, consumer costs. Here we assumed the incentives so the consumer wouldn't have additional costs but the government would pick up the incentives expense. And then it quantifies or it pulls into the TIAX full-fuel cycle analysis where we modeled derived results and it applies it here to the volumes and the time that they're employed.

And then we have the -- Here is another illustration on just the volumes on a single year basis of the greenhouse gases and petroleum reduction. And this is a 15 percent renewable diesel blend, perhaps like a low-carbon fuel standard level. And you can see the volume over each individual milestone year.

And the output of the model is a unified result showing the five milestone years. The incentive effect versus the volume of petroleum demand displacement. And these are in billion gallons, showing up about four to seven billion gallons maximum but I think around three billion is probably more realistic.

And then we have this on greenhouse gas reductions. I neglected to put in here this is million -- this says US Tons, US Million Tons is what it should be there. And this is based on an 80 percent greenhouse gas reduction benefit. That should be actually 70, sorry about that.

And then we identified staff recommendations. The three critical findings we have is that there is a lack of bulk storage in California and it appears to be getting less and less instead of growing. We see a limited demand for renewable diesel. I'm hearing reports of some diesel being produced in the state or in the nation and being sent to other countries where there is a higher market potential for them.

And then we talk about the limited in-state production. On one hand we see new designs, new capacity coming on line but the advanced unconventional fuels are not, are not there yet. And then perhaps the last recommendation is that we became very acutely aware of the need to develop sustainable biofuel policy or guidelines for in-state and for foreign supplies. Perhaps the low-carbon fuel standard will result in a process that will certify or improve this. And lacking that -- At this point I welcome comments that we can incorporate into this analysis that you could provide as a recommendation forward, as we move forward on this topic.

And that is all I have except for I have two slides from a gentleman up front who wants to raise a current issue.

MR. PETRAS: Hello, my name is Michael

Petras and I am with a company called --

PRESIDING COMMISSIONER BOYD: Mike, is your microphone on, the green light.

MR. PETRAS: I'm getting a green light.

PRESIDING COMMISSIONER BOYD: Good, okay.

MR. PETRAS: The company I work for is called Enagra Inc., it was formerly called National Biofuels. We're actually one of the largest biodiesel marketers in California. Over the last 12 months we have actually had a phenomenal amount of growth. We sold well over 22 million gallons to date in the last 12 months. Out of Los Angeles.

Specifically the issue we'd like to talk to you about is the lack of storage. Instead of expanding our storage options the Port of Los Angeles is actually starting to limit our storage options. Right now they have actually just announced in the last 30 days the closing of the Westway terminal. This is one of the few locations that are dedicated to biodiesel in the state of California. We currently lease over six million gallons of storage there. I believe there's also another million gallons of ethanol storage as well.

And rather than closing this facility because it's strategically located near major refineries it actually should be expanded. Instead they are basically going to close it over the next 18 months in order to put a park there.

So the one thing we look to as an industry representative to the CEC is how do we challenge you to actually help grow, you know, this industry if these are part of your objectives. If, you know, if we're going to let storage for something that is desirable taken off the market how can you help us develop other storage options over the next few years to meet some of your objectives?

PRESIDING COMMISSIONER BOYD: Could I just comment right here. Hearing you speak there is -- I believe the IEPR Committee has an infrastructure hearing to be held in June at the Port of Los Angeles. That would be an appropriate time for you and your industry to make your points again in a public forum.

MR. PETRAS: Thank you very much.

ASSOCIATE MEMBER BYRON: Excuse me, Mr. Yowell. Is there a reason why this information is on Energy Commission slides?

MR. YOWELL: It got absorbed into the format that we have when I put it into our system.

ASSOCIATE MEMBER BYRON: All right, thanks for the clarification.

MR. YOWELL: Sure. Do we have someone on the line?

CEC STAFF MEMBER: Yes, Harry Simpson. We're trying to get him on the line.

PRESIDING COMMISSIONER BOYD: Anna, did you want to address this issue while we're waiting to make this electronic connection that never happens?

MS. HALPERN-LANDE: Sure. Well once again I'm wearing two different hats. I just want to be very clear about that. One hat is Environmental Entrepreneurs, whose focus is environmental policy, which we believe is highly compatible with economic policy, good economic policy, to create market opportunity in the state, and the other one is a biodiesel marketer and producer myself.

So first let me speak from well sort of wearing both hats. I just want to suggest that currently in the fuel cycle analysis not included are biodiesel from second use sources like tallow, yellow grease and so on. If you look at the existing biodiesel producers in the state, people like Russ Teall's group, Blue Sky biodiesel out of Oakland, Ukiah Biodiesel and IWP. All those are small producers but all of them are making biodiesel from waste feed stocks.

And I think if we did the full-fuel cycle analysis we would find that there will be a premium fuel from a carbon perspective and a less premium fuel because we'll probably see that there's a bigger carbon reduction with these secondary feed stocks and I think we should be encouraging.

Recently in San Francisco the PUC and the Department of the Environment are rolling out a program to capture the fats, oils and greases. They determined that there is about 100,000 gallons worth of fats, oils and greases going through the sewer system every month.

At one location the manhole, they tested it and they saw 2,000 pounds per hour. The stuff, they have to go in and jackhammer it out at a cost of $15 million per year and with a $1 million program they're able to capture most of those fats, oils and greases. And then you have the city sell them to a local biodiesel producer and create biodiesel that would be used in the muni system.

This is the first city to ever do that and I think we should be encouraging that. And one way that this Commission can encourage that is to put those fuels into the fuel cycle analysis so that those people will get rewarded accordingly.

The other thing I want to urge the Commission to add to the analysis is palm. There are, for example, Imperium, Imperium Biodiesel, which is up in Washington state is planning a 100 million gallon palm methyl ester facility.

When we look at our global basis for our fats and oils that are available as feed stocks palm is one of the big ones. And we just want to make sure that it's done in the right sort of way. If we put in the wrong incentives and don't capture the full-fuel cycle analysis we're going to end up, you know, pushing it off to Malaysia where not all palm is grown in sustainable ways. Not all palm is grown in ways that we would be pleased with.

And I don't want to raise that bogey and talk about it but I do want to say that we should include that analysis to assure that it is, you know, I think there is a sustainable palm count. There is a methodology for that.

I want to -- So then putting on my industry hat I want to second what has been said about the infrastructure problems. But I do want to make, and I'm sure the Commission is aware of this, it is not, the storage issue is not just a biodiesel issue. If you look at the cost of storage, if you look at what's happening in the oil industry there is a run on storage and it is very difficult in general to get storage anywhere and the biodiesel industry just happens to be a victim of that.

That said, if you look at biodiesel in high concentration blends it is highly nontoxic and with appropriate spill containment one should be able to have moderate sized tanks in many more locations than we currently do.

And one way that the Commission could help the biodiesel industry is to come up with say a fast path, urge the various permitting agencies to come up with a fast path and potentially an incentive system to help with the infrastructure cost of putting in moderate sized tanks like, you know, a couple of 12,000 gallon tanks. That's a rail car and that enables petroleum distributors to be able to store the fuel.

What we typically find as marketers is that, and my colleague here is in a slightly different situation because he's bringing in boats full of fuel. That when you bring in fuel, especially if you're bringing it in from the midwest, it comes in rail cars. And if we can have some way to store it and get that storage up and running fairly fluidly that will greatly help the liquidity or the spread of biodiesel in the market. We are seeing a lot of fleets be very interested in deploying biodiesel and it is very encouraging.

But, you know, many of the issues that are outstanding such as we would see a lot more being used for example in generators in Silicon Valley. All the backup generators for all of the data facilities are diesel backup generators and right now they don't get any kind of air credit for running biodiesel in their generators as opposed to diesel.

And I know the ARB is working on it and

I commend them for that and I would ask them just if they could add to their very long list of priorities so that those folks could get a credit and would be incented to move their generators. I've had conversations with the Silicon Valley Manufacturers Association and they are very eager to do it. But then always say, well can I get an air credit, can I run my generators a little bit longer, and I have to tell them no, you'll still be in violation. So I would love to be able to tell them yes, the ARB is looking at it and they're trying to help you with that.

And then also I don't know exactly if this is an ARB issue but I know it's come up many times, which is the quality standard for B5 and B20 and, you know, the ARB participating or the Cal/EPA participating in helping to make that a very clear standard so that we get less bad fuel out there in the market.

That concludes my comments and I would like to commend Gary Yowell and his team for a great presentation and for many great recommendations.

PRESIDING COMMISSIONER BOYD: Thank you, Anna. I would invite you to make your presentation on infrastructure at the IEPR hearing that I previously referenced. Commissioner Geesman and Chairman Pfannenstiel are the IEPR Committee this year and are boldly going into the Port of Los Angeles to have another round of discussing, discussing infrastructure.

Commissioner Geesman and I were the 2005 IEPR team and we felt rather beat up and abused on the subject of infrastructure in the state so reasoned people like yourselves are very much welcome at hearings like that. I think Commissioner Byron and I will be there since we're the Transportation Committee and care about the issue.

ASSOCIATE MEMBER BYRON: That's right.

PRESIDING COMMISSIONER BOYD: But sitting behind the other two Commissioners.

(Laughter.)

CHAIRPERSON PFANNENSTIEL: We'll protect you, Jim.

MR. OLSON: Any other comments? Yes, and keep them brief.

PRESIDING COMMISSIONER BOYD: You can just stand at the podium there.

MR. JAGUNICH: I'm Bob Jagunich. I'm

with a start-up company called Biofuels, Logistics and Terminal so I'm going to be at your hearing. Just make a few comments.

While I applaud California indigenous production and feed stocks, and I think we should do everything we can to encourage -- and I agree with my colleague wholeheartedly, I think for the kind of numbers that Gary is trying to talk about to really reduce greenhouse gas you're going to have to look for feed stock supplies outside of California in the relatively medium terminal. Maybe in the long run there will be other sources but there's just limitations just in terms of gallons.

For instance soy bean oil they talking about. The USDA is talking about almost a 15 to 20 percent reduction in the amount of soy bean oil produced in the United States because of the alternative production of ethanol taking up US land space. So I think you are going to look for an oil feed stock such as palm.

And the issue to bringing the volumes, as has been reiterated here is, you need to have terminals. Terminals that are on the water to bring in boat loads of feed stock. It's shrinking. It's shrinking and you're running into this in Long Beach.

Because it's localities, it's real estate developers versus the available land that could be used on ports where boats can land and where you can put up tankage. And also the localities represent a very complex local political structure. We're involved with a couple of them. It would be very helpful if the Commission in any way can find ways of fast-tracking that because there are so many very small, parochial interests that you have to overcome, it slows down this process massively.

And despite all of your incentive if you don't have a place to either bring in biodiesel or any other kind of a fuel derivative or the basic feedstock to be used by local producers this whole thing grinds to a halt. We need your help.

MR. OLSON: Okay, other comments here on the panel? There's a person here in the room first and then we'll go to the phone.

MR. PETERSON: My name is Richard Peterson and my company is Alaska Natural Resources to Liquids. And I'm going to kind of ditto some of the comments and take Commissioner

Boyd's direction of appearing in LA.

We are also looking at bringing in large volumes of Fischer-Tropsch diesel to the extent that it would be about, about 23 million gallons a load, 500,000 barrels at a time on a tanker from a project we're looking in Alaska. And this has been one of the big issues that we've faced. Where can we bring the products into California.

One of the comments was made earlier, California is not an island. But in some respects it is and California has the most unique fuel requirements. And so you can build a plant here in California to supply this fuel or you can build it outside the state.

When you start looking at commercial scale, Fischer-Tropsch type plants on the coal-to-liquid CTL side you're looking at 80,000 barrels a day, over a billion gallons a year. If you're looking at the biomass plants that we're looking at in LA we're talking 5,000 barrels a day, 75 million gallons a year worth of facilities.

The people that have that technology can build those plants anywhere in the world and are being asked to build those plants any place in the world. So California is competing with the rest of the world, the rest of the US to bring this technology on this large scale here.

We need to be able to say to them that environmentally, yes, you build a good plant you will get a permit in a reasonable period of time. You all recall the California energy crisis in electricity. Part of it was the fact that people couldn't build new plants. The same issue is going to come with large scale plants.

Environmentally I think the Commission needs to address this issue. What can we do to give comfort to these people that environmentally they can't get permits.

And then the other half is, where are you going to store some of these products they're going to bring in. Because we can bring the plant in Alaska and bring the product to California or it can be built in Ohio and it won't come to California. Thank you.

MR. HODGE: I'm Cal Hodge, A Second Opinion, Incorporated. For the past 20 months or so I have been doing an extensive amount of work with Neste Oil. Neste has been working for the last ten years on a non-ester renewable diesel technology.

We share the concerns about the infrastructure of being able to import feed stocks in case they are not available here in California. One of the things about the non-ester renewable diesel though is that once you've made it, it can go in the existing infrastructure. And that simplifies a lot of your downstream requirements and we keep that in mind.

The other things I wanted to bring people up to date. Neste is starting up their 60 million gallon a year plant almost as we're speaking, very shortly in Porvoo, Finland, and they will be bringing some of that volume here for various test programs. They also have a very large test program started in Finland where they will be running it in their bus fleets at 30 percent and hopefully up to 100 percent as they go through time. That's the advantage of being a hydrocarbon instead of an ester. It fits the system. And we need to look for ways to make this happen.

PRESIDING COMMISSIONER BOYD: Dave, were you going to make comments?

MR. SMITH: No thank you.

MR. OLSON: There's a comment on the

phone.

MR. SIMPSON: Do you want the person on the phone to go now --

PRESIDING COMMISSIONER BOYD: Yes.

MR. SIMPSON: -- or is there anyone else?

PRESIDING COMMISSIONER BOYD: Please, the person on the phone who has been waiting patiently.

MR. SIMPSON: Okay. My name is Harry Simpson, I'm with Crimson Renewable Energy. We're a subsid that was formed last year, a part of a California oil and gas producer called Crimson Resource Management.

And we're constructing two large-scale biodiesel production facilities in California over the next 18 months that will have a combined capacity of 75 to 90 million gallons a year. So we have obviously spent a lot of time looking at biodiesel and the market dynamics. We currently treat the biodiesel through a terminal facility we own at Bakersfield.

A couple of comments. One on the infrastructure issue. I think a lot of attention has been given to, or the discussion so far is looking at port-based infrastructure to enable importation of foreign biodiesel. Largely, largely foreign at any rate.

I think there's perhaps an equally significant or maybe more significant issue which is infrastructure at the current bulk distribution terminals for diesel fuel in California. I'm talking about places like Kinder Morgan, some of the proprietary terminals owned by the majors as well as independent terminals operated by guys like us or let's say Interstate Oil up in Sacramento at the old McClellan Air Base.

There's a significant amount of investment that's going to be needed to be made specifically to support biodiesel and potentially assuming that investment would also support other renewable diesels.

There's the issue of segregated storage versus rack integration. From some of our discussions and even from some of the investments we made ourselves you're looking at between $700,000 minimum to as much as $2 million to fully integrate, put in a new segregated storage tank for renewable diesel and integrate the rack. To integrate with the existing diesel racks using either sequential or ratio of blending.

I think that's ultimately where we need to be in order to facilitate bringing renewable diesels to the market. Each of these terminals have to have that ability. And there's the issue of where that funding would come from or, you know, whether companies are going to take it on themselves.

When ethanol was mandated in California it was very simple. Because of the mandate every terminal had to make the investment and, you know, recoup the cost of that investment either through higher handling charges or what have you, while in some cases you eat some of the cost of that.

I think based on that a mandate recommendation would go a long ways to forcing the industry to develop the infrastructure at the bulk distribution facilities. Absent a mandate the state is going to need to look at some sort of incentive structure in states like Oregon, for instance, where they rebate 35 percent of the cost of new infrastructure at bulk distribution facilities for renewable fuels. And they rebate that over the course of five years. A program like that might be worth looking at.

So I just wanted to highlight for the Commission the importance of looking at the existing bulk distribution infrastructure and what is going to be needed to support that. I think the issue of storage tanks at the ports, frankly I'm not so sure how much -- these are all done at a local jurisdiction in quasi-private organizations. You know, LA wants basically space, the Port of LA wants space for frankly the container business and that's why Westway got the boot. It's their land, it will be hard I think to change that.

But I think that's not necessarily a death knell for meeting the goals of what we want in terms of renewable diesel consumption and displacement of conventional diesel. Most of the existing bulk distribution terminals have access to rail, plus there's going to be in-state producers like ourselves who can easily truck the product to the existing bulk distribution infrastructure.

I am assuming, obviously, that biodiesel isn't going to make it into the pipeline infrastructure. And to the extent that the next diesel from Neste or others make it (indiscernible) pipelines, great.

Because I think frankly the demand, the goals that we're trying to lay out in this plan far exceed the ability of any one type of renewable fuel to meet the requirements. I think there could be a fairly long period of time where different types of generations of renewable diesels all would be in the market at the same time. There's enough for everyone to play. But I think the infrastructure still needs to be looked at. Particularly at the existing bulk distribution infrastructure.

One other comment was about, you know, biodiesel. In particular someone said, I think National Biodiesel, they move 22 billion gallons to California. If you look at the '06 consumption figures versus '05 you'll see a pretty healthy jump. A big part of that was the marine industry summit, which frankly was a runaround on the tax credit laws at the federal level where biodiesel was being imported into California. The federal tax credit was taken and then that biodiesel was shipped either to Mexico or Vancouver for use by the cruise ship industry.

I think if you look at the broad market, particularly in the transportation sector, you are not seeing a huge amount of growth of it. If you go out, if members of the Commission go out and talk to some of the existing large distributors in California of biodiesel, you know, to get to a 200 million gallon consumption figure they're not going to get there today because frankly the pricing structure doesn't support it.

Biodiesel today costs on average at the wholesale level 20 cents more than rack diesel prices. And I think the issue of how to stimulate demand to make it price competitive you're going to need certainly additional incentives I think to get to a five percent level. Or you need a five percent mandate.

And I think it is important that the Commission look at trying to establish some sort of a baseline level. And I think five percent is probably a pretty good number to work with if we can get here within five years. Because if you don't establish that baseline it's kind of hard to envision how you're going to get from a base, from a zero point to, you know, ten percent consumption or some other higher target level of renewable diesel consumption in the subsequent years.

On the supply side I think domestic supply is certainly sufficient to meet California's needs for a five percent level. For instance, currently half of our biodiesel production goes to Europe right now just because of the lack of demand based on pricing versus pricing and demand in Europe. Then with in-state production, and particularly on a large scale from companies like ourselves or Imperium just up the coast. Plus you have international supply.

The port storage infrastructure notwithstanding I don't think that is really an issue. It truly is an international commodity because of the lack of tariff supports or tariff protection here in the States for imported biodiesel. So hopefully that will be independent. Anyway so that wraps up my comments. Thank you very much.

MR. OLSON: Okay, any other comments here? Jim Larson.

MR. LARSON: I'll make it really quick. Jim Larson, PG&E. As a large diesel fleet operator I'd like to start out by saying that we have committed to I think it's 30,000 gallons of biodiesel use in our own fleet this year. We have worked our way through the Ford fuel tank incompatibility problems and are still struggling with engine warranties for some of our heavy duty vehicles being honored at higher biodiesel blends.

But two questions for Gary on the presentation. On slide 11 there's a biodiesel, the first bullet says 50 percent GHG reduction. Is that neat, is that B20?

MR. YOWELL: That's on a neat basis.

MR. LARSON: Okay. And on the emissions table on page 19 there are positive and negative numbers.

MR. YOWELL: Those are IEPR '05 values that will be updated very soon.

MR. LARSON: Okay.

MR. YOWELL: I do have the updated greenhouse gases in there but not the life cycle on the criteria.

MR. LARSON: So if it's a positive number it's a benefit, if it's a negative number it's an increase then in emissions?

MR. YOWELL: That's correct, that is correct.

MR. LARSON: And that is counter-intuitive as I see there's a NOx benefit here whereas I thought that at low blends there was actually a NOx penalty with biodiesel use.

MR. YOWELL: Is that a negative there?

MR. LARSON: It's a positive number.

MR. YOWELL: Okay, I'll check that out.

MR. LARSON: Okay.

MR. YOWELL: I have a question for you before you leave. What biodiesel blend are you using?

MR. LARSON: We're using B5 because our engine warranties aren't honored at B20.

MR. YOWELL: Thank you.

MR. LARSON: We'd like to use B20.

MR. OLSON: Okay, if there are no other questions, Commissioners and Chairman Sawyer, we're taking a little diversion from our agenda here. One of our speakers, Dan Sperling, has to leave, he has a schedule that he has to meet. What we'd like to do is kind of bring him forward to actually the original time he was supposed to speak.

So just a little bit -- Because we're a little bit out of order let me just kind of set up a little bit. We originally wanted to have a discussion of our updated full-fuel cycle analysis. We'll still have that but it will be a little bit out of sync.

Dan Sperling is one of the new board members of the California Air Resources Board. He is also the director of the UC Davis Institute of Transportation Studies and was one of our key collaborators on interlinking the full-fuel cycle analysis and the low-carbon fuel standard on the Governor's Executive Order. He is here to describe kind of a status of where that low-carbon fuel standard is and some of the background on that. So Dan Sperling, please join us.

ASSOCIATE MEMBER BYRON: Commissioners and Chairman Sawyer, I need to be in San Jose for a meeting at six so I apologize, I'll be departing at 3:30 but I'll be joining you by phone.

PRESIDING COMMISSIONER BOYD: We'll listen for you and the traffic noise.

DR. SPERLING: Well thank you, thank you for allowing me to speak at my appointed time. I do appreciate that.

I should say I left a copy of all my slides and the executive summary of our Part 1 report out on the table there so I won't be upset if you run out there and get it.

So I am going to talk about the low-carbon fuel standard. Many of you, most of you know about it. I should -- I have this first slide up there to indicate that we did this study in a very quick time especially for academics, in about three months.

There were a large number of people involved in it, these are the contributors. There was a team of researchers at UC Davis and UC Berkeley. In addition to that we consulted with actually many of you out there in the audience here on this. So this has been a massive effort by any metric.

And I should say, so what I am going to talk about here is what we're suggesting to the Energy Commission and ARB for the structure of this low-carbon fuel standard. And of course there will be an entire rulemaking process that's gone through over the next year and a half or so to convert some of these ideas into actual rules and perhaps not even to follow some of the suggestions.

So with that background -- And I should say just to get rid of any of the anticipation here of the no surprises in terms of processes.

Many of you know there's two parts to our report. The first, there was a draft version of that that's been floating for a few weeks. The final version of that will be out within the next few days. The executive summary is done and it's out there. And the Part 2 report will be distributed next week for stakeholders and other interested parties and then the final of that will be a few weeks later.

So with that prelude. Okay. I have quite a few slides here and I know we're way behind schedule here so I am going to actually skip some of them and summarize some of them. But I do want to start off making the observation, and this is my own personal observation, that this really is a hugely important initiative that we're undertaking. And for me who has been involved in working with transportation fuels and alternative fuels for some 25 years now -- in fact I remember standing right here in the early '80s debating about methanol and CNG. This is something that I have been working on a long time.

And I guess to give you my bias as I come towards this is many of us, you know, including Jim have been working on this for so many years and we have seen -- you know, I use the word failures. People don't like the word failures but non-successes, you know, time after time.

So why I am so excited about this and why I bought into the process of helping put this together, why I thought it was so important, is because I see this as a durable framework. A structure for guiding investments to the transition, in the transition to alternative fuels. And so this is a mechanism. This is a broad, durable, potentially durable comprehensive framework that we have never had before. This is really something unique and special.

Now having said that a couple of background notes as here. The low-carbon fuel standard is still only one strategy to reduce greenhouse gasses from transportation. In a broad way you can think of there's the vehicles, there's the fuels and there's people end users. You know, VMT. So what this addresses is the fuels. There's 1493 that addresses, the Pavley bill that addresses the vehicles and someday we'll have to get around to the people to travel.

And the second point is that there have

been many, many people as I indicated that are involved in this. There has been a lot of collaboration. We spent hours and hours with oil companies, electricity companies, environmental groups. So there's been a lot of input into this. But still in the end it's our research team, you know, Professor Alex Farrell from Berkeley and myself, co-directing it. You know, we take responsibility for these recommendations.

Okay, so to move on here. These are kind of the principles that we used in thinking about and designing, proposing a design for the low-carbon fuel standard.

This idea of a durable framework that is relevant both for near-term and long-term transition, sending consistent signals to both industry and consumers. Synergistic with the 1493 rules for vehicles.

That it should stimulate technological innovation because we do need change. We can't just set up and say, okay, we're going to have a large introduction of low-carbon fuels tomorrow. There does need to be some innovation.

But we're using a performance standard, it's premised on a performance standard.

And so this is the idea that governments not picking winners nor losers. And it's the idea of giving industry as much flexibility as possible in figuring out how to meet the targets.

Using a lifecycle approach.

Relying on measurable data as much as possible as opposed to forecasts and analytical, future analytical methods that might be used.

And very important, we are not an island and so the idea is that this has to e consistent if not compatible with other states, with whatever happens in Washington, what happens in the EU and other places.

And this idea of starting with baby steps, you know. Allowing for institutional learning. This is something, we have never done anything like this before. This is going to be difficult. But as I'll argue and explain, it is very doable but there is going to be a lot of learning along the way. And so I use the expression starting with baby steps but, of course, before the baby steps comes the birthing process. I've observed it but I have never actually undertaken it. I attest to it can be traumatic at times.

All right, so there's the two reports I referred to earlier. The first report that many of you have seen addresses the question, is the ten percent target, this is the number that was in the executive order that said that -- was proposing a low-carbon fuel standard with a target of up to ten percent reduction and I'll explain that in a moment. Is it feasible and cost-effective. And the Part 2 report that will be coming out soon addresses the question, what are the key policy choices and how do you actually implement this. But I will address that Part 2 in my presentation here. I have kind of merged them together into one presentation.

So some of the ways to meet this low-carbon fuel standard is to use low-carbon fuels, biofuels in particular, to be blended in with the gasoline and diesel fuel.

To introduce low greenhouse gas alternative fuels, electricity, natural gas, hydrogen.

And companies can buy credits from other low greenhouse gas suppliers.

And I'll say low-carbon and low greenhouse gas, I'll intermix the two. I mean the same thing. And I always mean lifecycle as well when I say that.

All right. And the point of regulation that we're suggesting is that it be placed on the refiners, blenders and importers. These are the companies, these are the companies that manufacture or import the transportation fuels.

And what's being regulated is all gas. What we are suggesting is all gasoline and all diesel fuel. And we say all gasoline and all diesel because some of the gasoline and diesel is used for off-road applications but the oil refineries and the oil companies have said to us many times that it would be almost impossible if not impossible to try to segment that out. And they supported including all of them in the standard so that's what we are suggesting.

We would have liked to include jet fuels and marine fuels, bunker fuels, but the state doesn't -- the state lacks full jurisdiction over these. But mechanisms can be set up to give credit for anyone that does substitute for a higher carbon jet fuel that comes in with a lower carbon fuel version of biodiesel, for instance, and credits could be generated that way, is what we're suggesting.

So the first question was, is this ten percent target feasible? So to answer that question we constructed scenarios of the whole range of fuels and vehicles that might be used to meet the standard.

So the entire range of fuels. Of course the ethanol and a variety of other biofuels that have lower carbon, lower lifecycle carbon associated with it, lower greenhouse gas.

And all of the kinds of vehicles that you can imagine. Diesel, flex fuel, plug-in hybrids, battery electrics, fuel cells.

And to do this we had to come up, we came up with this measure, this calculation of what we call a carbon intensity. It's actually average fuel carbon intensity and it's really a lifecycle measure of all greenhouse gasses. So carbon intensity, as I said, is just a shorthand.

And so we included, you know, CO2, nitrous oxide and some other greenhouse gasses in this. And we do note, and I'll get back to this in a moment, there is a big controversy about land use and to what extent you can include land use in calculating the greenhouse gasses associated with biofuels. It's a difficult question I'll come up to.

And the other thing is we adjusted all of the, all of the metrics that we used for the efficiency of the motors or the propulsion systems in vehicles to take into account that diesels, electric motors, fuel cells are all considerably more efficient than a gasoline engine.

So this is just a list of, this is a representative set of fuels that were used in constructing these scenarios. So you can think of the gasoline, you know, that's like one, because that's the baseline at 92.8 on the right side, and then everything else gets compared to that. And so these are just representative values.

And I should say we used the GREET model that TIAX converted for use in California. And we made some adjustments to that but mostly used the GREET model.

Those of you that saw an early version of our report, Part 1 report, probably all remember one table very clearly and that was a table where we compared the GREET numbers with the numbers, the lifecycle numbers from the LEM model, the one that Dr. Mark Delucchi has.

And we did that to show, to highlight that there's still a lot of work needed to really pin down some of these numbers. There's a lot of variation, there's a lot of assumptions, and so we keep that on the table. This is the process that is going to be needed over the next 18 months or so to be refined. And much more than 18 months, over the next -- forever future.

So okay, moving right along here. And so we also -- in doing it we used a model that was created at Argonne National Lab. We adapted it for use in California to just take into account vehicle turnover and so on in creating the scenarios.

And this is just kind of a set of illustrative scenarios that we used. We had a business-as-usual scenario of course.

And then what would an electric drive scenario look like in terms of what kind of penetration is reasonably plausible or possible, you know, without stretching one's imagination too much or without implying extraordinarily high costs or without going beyond the kind of resources that are fairly readily available.

And so with electric drive it actually,

you know, we could see up to about a five percent reduction in this time frame going to 2020. So this is a five percent reduction in greenhouse gasses associated with a unit of transportation fuel.

So remember again, this is a performance standard, it's not a cap. So if there's more fuel use of course the total goes up. And the response to that is just to anticipate all of the concerns. It is a performance standard but that performance standard can be tightened. And of course we expect it would be, should be tightened after 2020 as more progress is made. As circumstances change costs come down and so on.

So these are sets of scenarios you can see. They are meant to imply that there's some that are easier to do or some that are able -- we can do with minimal change in infrastructure, in fuel infrastructure, others require more change. Others are more complex.

And you can see we even got to scenarios in which we said it's not entirely implausible that a 15 percent target could be reached with a lot of innovation,, with a lot of change that could happen. And obviously with more costs.

So, you know, just one observation is on the electricity side, if you recharge off-peak there's plenty of capacity. That was a big if. We won't be coming back to that if unless anyone wants to.

And of course for heavy duty, so heavy duty vehicles are within this also so there's various ways to reduce the carbon associated with heavy duty diesel fuel. It is probably a little more difficult than it is on the gasoline side but there are a fair number of options to do so as shown here.

So this is a slide just to show, this is just illustrative. It shows at the top, the two curves on the top are for total fuel and gasoline fuel consumption in the business-as-usual. And you can see that it tends to start going down in a few years and that's because of the influence of the 1493 standards.

And down at the bottom here are the alternative fuels we were talking about.

So this is just blowing up those lines from the bottom. And these are the kinds of curves that we see generated through the scenario analysis.

You know, we have a large number of these curves in the report, you can look at them, but it shows different, how different fuels might come into being at different rates. And to reach that 10 percent target, or in a few cases the 15 percent target.

Cost-effectiveness. This is going to be a controversial issue. I can only guess at that, right. You know, clearly there has to be a lot of innovation. You know, clearly we're not ready. We don't have, you know, the fuels out there to just turn on a dime and get to this ten percent goal.

But there are many tools and there are many technologies that are at hand. There are many that are commercialized and there's many that are on the verge of being commercialized. But certainly what's needed is -- even corn -- You know, to use our, for some of us our favorite whipping boy, corn ethanol. But even corn ethanol there's lots of opportunities to make, to reduce the carbon associated with that. And, you know, we have estimates up to, you can get up to a 50 percent reduction in corn ethanol relative to gasoline is possible.

And the other part of this, you know, in terms of the cost-effectiveness is the point that an important element of this whole program is credit trading. So there's lots of options and lots of opportunities to be able to minimize the cost. There's flexibility. And if something doesn't evolve in a way that some of us might expect others might evolve even faster.

And this is one of the things that I have learned in working with a lot of senior research executives and other corporate executives is that, you know, they say over and over again, you apply the resources, you know, to a problem and good things happen. Not necessarily in a predictable way but large progress is made. And so that's underlying this initiative certainly.

So, you know, we concluded that the ten percent target does seem reasonable. There are technologies and fuels out there.

They are not necessarily the best ones for meeting it but there's a lot of other low-carbon options out there either on the verge of being commercialized or pretty close. And we are talking about the next 13 years.

So the question then is, how does this

all work? One of the key features is that -- One of the principles I guess that I didn't list there is that we're trying to make this as transparent as possible on the one hand and reduce the administrative burden as much as possible also as well.

So the way to do that is to create default values for fuel paths. In other words, you know, for corn ethanol we'll come up with a number that's conservative. A conservative number. And we assign that value to corn ethanol or to plug-in hybrids, battery electrics and so on, different kinds of cellulosic fuels. You assign a value. It will be a conservative value meaning not a big improvement. And it won't be the worst case for that particular fuel pathway but it won't be too much better than that.

And these default values would be defined and established and then a company could just accept those values in doing their calculations in meeting the standard or they could provide documentation why their particular fuel and path is much better than the default value. And this would be, could be subject to third-party certification.

Credit trading I said is a big part of it. You know, we're suggesting trading and banking among all transportation fuel providers. What this means is over-achievers, ones that more than beat the standard, will generate credits that they can sell to others.

So the question then becomes, does it have to be just among fuel providers. And what we're suggesting here, as I said earlier, we can allow, we would suggest allowing an opt-in for aviation fuels, bunker fuels and also allow these off-road applications to be available to allow to generate credits.

So then the question becomes, okay, so you've got all the fuel providers in here. What about the car makers. And, you know, we have the 1493 hopefully coming into place soon. You know, it's natural, any good economist would tell you that you should definitely allow trading between the automakers. In fact trading with all the other sectors.

This is where the baby step principle comes in. It's going to be very complicated to implement this even just with the fuel providers. And maybe the trading won't work real well in the beginning for various reasons but the performance standard still stands and still exists. So what we would suggest is to stick with just the fuel providers initially.

At some point we would anticipate you would want to bring the fuel, the carmakers in. But into the foreseeable future we cannot imagine extending this to other sectors, and that's because the transportation sector is rather unique and there are reasons to think that offsets or other trades are allowed there would be very little pressure for innovation in the transportation sector.

So one of the big, one of the big questions is how does this interface? So this is a lifecycle standard. And, you know, as an academic that sounds very simple and straightforward. You know, of course it's a little complicated to do it but the concept is pretty simple.

But what happens here is we're imposing this on a larger system and so for the lifecycle standard it is going to extend all the way from the oil refineries and the oil production and all the production activities all the way to the vehicles.

And what that means is, as AB 32 caps go in place, which we're anticipating there would be caps on the oil refineries, there would be caps on the electric utilities, electricity generators. What we're seeing is this low-carbon fuel standard is overlapping with those.

And so the question is, how do you deal -- is there double-counting, double-crediting? Do you include -- Sometimes do you include the upstream emissions and sometimes not? And so we're involved in a continuing -- This is probably the one question we might not even come to a resolution on in our recommendations because there are some fundamental issues at stake.

And there is not a theoretically pure solution and there is not an elegant solution to this and there's a lot of practicalities that get in the way. So this is probably something we are going to punt to ARB and say, you figure it out. But we'll give lots of elaborations on the pros and cons.

Electricity. So electricity would be included here and there's lots of ways of generating credits. You know, it could be everything from all these off-road applications to airport forklifts, equipment at airports, construction and so on.

The land use change is a very controversial one and it's wrapped up in a larger issue of this, what people call the sustainability question. The problem is the science is not, at least in our judgment, the science is not real settled on understanding what the land impacts are.

When I say that what I mean is that if you have land that is intensively cultivated and you just use another crop, you know, then there is not going to be much change in the sequestering of carbon in that soil. But if you have prairie land or if you have rain forests which have been sequestering carbon for a very, very long time and you go and cultivate that there's huge releases of carbon. And we have done some early estimates and some of these numbers are mind-boggling how big those carbon releases can be.

So clearly these effects on land change have to be considered. And what we don't feel like the science is here yet to be able to do that in a definitive or confident way the GREET model has just a tiny piece of it that deals with land use change. But in kind of an outdated way It doesn't have the most recent information, and in a very partial way.

One of the reasons the LEM model comes up with very different numbers than the GREET model on biofuels is that it does try to handle a lot of these land changes. And therefore it ends up making biofuels probably look worse than what the GREET model would say, for instance, if you take into account these line changes. So we can get into this later.

But we're going to probably suggest that there be just a very simple way of handling it the first five years or so and then research be done and then more definitive models and protocols be developed for handling it at the mid-course correction. Some might want to call it that, which we're suggesting after five years. So there's a lot to this.

Let me move on to end this. So there's also the related issues, environmental justice and sustainability, because there are a lot of impacts associated with using fuels. There's no free lunch as they say. Everything you do is going to have some kind of impact.

Actually I forgot to take this quote out. I presented at a symposium, we had a symposium a couple of weeks ago. That very day in the newspaper they had a quote from Fidel Castro that said that the low-carbon fuel standard was going to kill three billion people. I thought wow, that's pretty impressive that he even knows about it. It says something for California that he's paying attention to something like this. He didn't actually say the low-carbon fuel standard but he said, a program that greatly increased biofuels. It was the food versus issue he was supposedly referring to.

So what we would, what we're strongly urging is that there be a reporting requirement created for energy providers for regulated entities to report some of these, report these sustainability impacts.

And I want to emphasize that we're very sensitive to this. This is a very important issue. But, and this is one of the controversial parts of it is that the low-carbon fuel standard, we'd like -- How do I say this diplomatically? There is a lot involved in implementing this well.

And it's the baby steps idea, it's the institutional learning idea, and so we'd like to see it kept as clean and transparent and simple as possible.

And so the concerns, the sustainability concerns, you know, the biodiveresity and habitat loss, which are very real concerns, initially be handled through a reporting requirement. And then further discussion can be had about whether there is some need to actually have a regulatory process to deal with some of these but that it not be part of the low-carbon fuel standard.

There are people in companies that said, you put that on the low-carbon fuel standard it's going to kill it and I am sympathetic and probably agree with that. Just that it will be burdening it and creating so many difficulties and controversies.

So anyway, so as you can -- You know, of course as an academic I always have to say this, we need more research. But I am not going to say we shouldn't do anything. There is a lot. This is something new. No government has ever done anything like this.

Fortunately in the EU they are in

parallel doing something similar to this. They are more focused on biofuels. But we're in close coordination and communication with the Europeans and sharing a lot in terms of, you know, a lot of the default value idea and the framework for that actually came from them originally for instance.

And we need to -- We're not an island. You've got to coordinate with all the others. So the timeline here is that the end of this month the Air Resources Board will -- I guess first this is going to be -- I guess this is definitely going to be included as an appendix to the AB 1007 plan. The Part 1 report will be.

After that ARB will be considering this as an early action item later this month. If it's adopted then it goes through the rulemaking process. The regulations would take effect January 2010. And then we would suggest in 2013 starting a five year review and then in 2018 starting another review for a tightening of the targets beyond 2020.

So in conclusion I do, I really believe this strongly. This is one of the most important initiatives, policy initiatives that we can be doing. It will play a huge role as part of the whole AB 32 initiative and it will play a huge role in just helping accelerate the transition away from petroleum fuels.

Yes, there's uncertainty. Yes, there are challenges. Yes, more research is needed But this is something important and we all are going to have to work together to make this work. But hopefully we all buy into that. Thank you very much.

CHAIRPERSON PFANNENSTIEL: Dan, let me just thank you very much. It was a great presentation. I've heard it before and it gets better every time. And your report was really well done. I think that you and the whole team should be commended for doing so much really good work on such a short schedule.

My question really gets to the credit trading. And I know you had said this is something that, you know, you're working on in concept but there are questions yet. The Europeans have a more developed cap and trade scheme for their greenhouse gas emissions than we do at this point. Are they looking at adding a trading scheme for a low-carbon fuel standard in what they're looking at? And if so have they decided or thought through how to reconcile the two systems?

DR. SPERLING: To be clear they don't have, they have not put any caps on the transportation sector.

CHAIRPERSON PFANNENSTIEL: No, I'm sorry, but on the rest of this.

DR. SPERLING: On the other areas, that's right. They are looking at trading. They are looking at -- In fact in this case I think they have been getting a lot of ideas from us. They started out with biofuels so -- And they started -- They have a mandate in place actually in the EU right now and that's kind of created a lot of controversy and a lot of difficulties. That's where the sustainability questions came up because they have been importing palm oil from Malaysia and cutting down rain forest and creating a lot of problems there.

So they have been working with a mandate actually in this particular case. And I think they are looking to us in this particular situation to help them think through how this trading would work.

And they did also just start with

biofuels. In the UK especially they started with biofuels and they did not include electricity and hydrogen in that. I think now they are going in that direction as well. So the short answer is no, they are not ahead of us on that.

CHAIRPERSON PFANNENSTIEL: Thank you.

PRESIDING COMMISSIONER BOYD: Dan, a question if I might getting back to the GREET versus LEM. And I don't want to make it seem like a contest. All the points you raised as it relates to biofuels. And of course you and our staff have been working so closely together we have been quite familiar with these issues.

On the land use component, and as it relates to the biofuels for California I was just wondering, since you're talking about the need for maybe over a period of five years to use GREET in an improved form and continue to improve it. There's a little bit of, you know. There could be a little bit of a chilling factor that has been raised here recently with regard to biofuels use in California.

As you know this agency, and yours truly are leading the biofuels program for the Governor trying to stimulate biofuels use, but particularly the development thereof in California, particularly from the waste stream first before getting around to maybe growing energy crops.

I was just wondering if one could say since California probably won't initially dive into the growing energy crops before it tries to use its waste stream in the whole biofuels area, whether that is less of a problem therefore for California with regard to the greenhouse gas benefits.

If we concentrate on the waste stream I think there are more significant benefits than there would be if we went into using land to grow energy crops and uncovering all these other issues. I think we may have to make that point fairly strongly over the next several weeks, particularly I guess in the next month or so, as we both debate this issue.

For instance, on June 11 in this room we're going to have another hearing like this on just the biofuels issue with the interagency working group on the subject along with the CEC. So I have been worried about things like palm oil and what have you and the fact that that could beget sustainability problems, as you referenced.

But I am just wondering if we can come to some kind of an understanding and a little publicity on this point that California can follow a path that's probably pretty positive in the beginning as we build up a demand and then may have to move offshore. If California is an island, offshore to obtain other commodities to use in biofuels.

DR. SPERLING: Well the point you make is exactly right. It was on my slide but I was racing through it. And that is, you know, the point that if you use residues and wastes and landfill gas then we can -- we know those numbers pretty well. Those are the pretty certain numbers because you are not having any effect on land, you're not having any land change effect.

So those numbers we know they're good -- and they're very good. You know, they're very low greenhouse gas numbers. So that clearly will not create any uncertainty in terms of investments, in terms of what's going to happen to change in the future. It's only in the case -- What happens is when you have a large expansion of land used to make biofuels and those lands are diverted from uses that are not intensive agriculture. So that's where the issue is.

PRESIDING COMMISSIONER BOYD: And I guess another fuel type is renewable diesel, vis-…-vis biodiesel. Even renewable diesel has less of that hangover problem. Thank you.

Tim, did you want to invite public questions?

MR. OLSON: Yes. Are there any comments? Yes, Joe Sparano.

MR. SPARANO: Gosh, it's been so long so I've been at the podium. It brings back wonderful memories. Joe Sparano, the Western States Petroleum Association.

Dr. Sperling, I want to first compliment you on the job you have done. You and your team have done an absolutely terrific job. I think you're aware that our industry, and our association in particular, supports your basic principles. One of them however does give us a bit of a problem, and that is troubling, and that is limit periodic reviews to protocol and methods but not targets.

We'd just like to clarify, like you to clarify whether or not you have considered or would consider instead of the five year review that is built into your plan and shown on a number of your slides whether there might be a review, perhaps even done by the CEC, maybe in conjunction with what they do now every two years for the IEPR, to take a look at what effects are going on with transportation fuels, with the supply and demand.

We all know that this is going to be a bumpy road before we get to a position where we have a lot more of the renewable and alternative fuels in the transportation market than we have today. One of the risks we all run is that we have a shortfall and we are needing conventional, whatever you want to call them, cleaner burning fuels.

And we want to ensure that there's a periodic look to make sure that we're not setting ourselves up as a society, not an industry, but as a California society for a situation where supply and demand get so tight or so out of balance that we create market volatility in the spirit of moving to a low-carbon fuel standard.

DR. SPERLING: Well if I were you I'd say exactly what you just said in your situation.

MR. SPARANO: No, that was actually from

the heart, not from the head.

DR. SPERLING: No, no, I know. But it's very reasonable, you know, to say that. But our take on it is that, one we're creating a performance standard which gives flexibility. Two, we're allowing trading, which allows even more flexibility.

And if one starts creating off-ramp safety valves and so on it really creates an uncertainty and reduces the resolve of a lot of players and probably reduces the investment that is likely to follow and the innovation that is likely to follow.

You know, I am fully aware of the implications of what that means. But if you come back to the AB 32 law, and if we're serious about meeting that 2020, you know, goal, you know, there are going to be some difficult decisions made along the way.

But our judgement is that there are a lot of options. There's a lot of ways of meeting it. We feel that it would be appropriate to stick with that target number, understanding that there is a lot of flexibility built into it.

And your folks when they start looking

at it carefully are going to find that there's a lot of devils in the details. You know, you start playing around with baselines and other things and light duty diesel and things like that. There's going to be -- I mean, if I were in the environmental community, put myself in their shoes, you know. I'd say that well, there are all these options that are very significant. And if we reduce the pressure then we have almost no chance of meeting those 2020 goals. Speaking as an objective academic, of course.

MR. SPARANO: And speaking objectively with an observation you should know, and I think you do but maybe the broader public is not aware, that the industry that represent, that WSPA represents, is already heavily invested in many of the alternative and renewable fuels.

And consistent with their current method of investing, which has a very long time frame, these folks are not interested in getting in and getting out and going in and backing up. We're just all legitimately concerned. Right now we are under intense pressure whenever there's a price movement in the marketplace.

We talked earlier about infrastructure

and I'm going to raise it later if I get a chance to talk during the public comments. Infrastructure, and parts in particular, is an incredibly growing and challenging problem for all of us and for fuel supply. That's just steady state with no march toward low-carbon fuels.

So the concern we have is not that we want to pull back and take a pass or take an off-ramp. I've heard those words before. What we're concerned about is that we could easily get into a situation as fuel providers and as fuel users around the room where we are in a period of extreme volatility. And we are just suggesting a more frequent look might help us stay away from that.

DR. SPERLING: Just one last observation. Having observed the Air Resources Board over the years, you know, if there is really a major disaster problem the Board has always been willing to relook, you know, at some situations. So even though -- So what we're doing is just saying that we really think there should be resolve on this issue.

But of course, you know, if all the cellulosic technology, you know, ends up costing

$10 a gallon and no one will buy a plug-in hybrid at any cost and, you know, corn ethanol turns out -- you know, when the land effects is not giving any benefit at all. Then of course we would have to, you know, relook at what -- That to me is an extreme situation and hopefully won't happen.

MR. SPARANO: Thank you.

MR. OLSON: Yes. Please state your name.

DR. PYLE: My name is Jason Pyle. I'm the chief executive officer of Sapphire Energy. I'd like to speak in favor of Dr. Sperling's proposal to give a grace period of land use in the state of California for the development of the biofuels industry.

I think before we rush into making measurements and judgments about how we should use the land in California we should be very careful about making sure that we're doing the right things and have the right numbers.

I'm particularly concerned about, you know, as we're trying to encourage the nascent biofuel industry in the state of California, and me particularly where I'm interested in developing in-state production of fuels and fuel alternatives for the state, that we do something early on that would discourage the biofuel industry from taking root here.

I would just like that to be a thought of this distinguished council before they make any moves towards that direction.

DR. SPERLING: If I could just play off of Commissioner Boyd's comment a moment ago, though. Keep in mind that all of the waste streams and residues, which there is a huge amount in California, you know. Those are highly beneficial under almost any circumstance or metric that is used. And it's really only when new land is brought into intensive agriculture that has not been, where there is a real issue.

And even then if you have cellulosic processes, you know. What we need here is a transition to really low-carbon biofuels. I think those investments will stand up, you know, to any kind of analysis that will be happening.

DR. PYLE: And I completely agree with that. The waste stream in California is a very important component of our biofuel initiatives.

But I also want us to keep in mind that the vast majority of biofuels and biofuel projects that have the capability to support the type of BTUs that we need in liquid fuel transportation or fuel transportation is going to require solar acreage, as we call it. And that solar acreage has to come from somewhere.

And if we simply decide that we are not going to do that in California, well then we're going to do it in Malaysia or elsewhere. So, you know, I encourage that we think carefully about that and make sure that we don't, we don't snub that industry before we get started.

PRESIDING COMMISSIONER BOYD: Please don't infer from what I said that I meant we don't do anything. I'm quite aware of a few projects, including the sugar cane in Imperial Valley project that have been on the drawing board for years that obviously will go forward.

It's just that luckily we don't have to start from zero and begin growing things to make energy. We have a running start in another direction while they address the uncertainties that Professor Sperling pointed out.

DR. PYLE: I appreciate that, Chairman.

MR. WUEBBEN: Good afternoon, Mr. Chairman Boyd and Members. I am Paul Wuebben and I am the clean fuels officer with the South Coast Air Quality Management District. And we really appreciate the efforts of both of your agencies in convening the hearing and certainly the important work that Dr. Sperling has undertaken.

There's just several observations I think we'd like to make at this moment, at this point in the record. I think it's certainly important to recognize that it may be a little premature to describe this as the most important policy initiative ever undertaken. As I remember there is a small initiative called CAFE that has achieved the single largest carbon reductions in US history. So we're hoping that this could achieve, you know, equal or more than the CAFE standard.

I think what we are really focused on at this moment is the imperative really of starting carefully. And we certainly agree with a lot of what Dr. Sperling is noting about starting carefully.

And in that spirit I think what is central is that we make sure that we avoid a potential serious incentive that could occur to light duty dieselization if there is a combined performance standard. There can be severe air quality implications depending on how such a standard is introduced relative to particulate, fine particulate matter in particular. We've had conferences, for example, on fine particle. Not just grams of emissions but the numbers of particles. What are called ultra-fine particles.

Recently you may have heard that our board unanimously adopted a resolution just several weeks ago calling on the Governor and the President to declare a state of emergency on air quality in the South Coast Air Basin in light of several key facts. And perhaps the most specific is 5400 premature deaths annually in our air basin due to current levels of air pollution.

So we just want to make sure that as we proceed in this important initiative of crafting a careful, low-carbon fuel standard that we do not exacerbate ambient quality. And for that reason we think it is absolutely certain or essential to start with a defensible, careful program, setting performance standards for each of gasoline and diesel separately rather than jumping perhaps, you know, too quickly into a unified kind of concept.

One last quick point which is that I think we would all agree that this enterprise is critically dependant on our success in auditing and validating the so-called default factors which are going to drive the commercial marketplace. That you really need to understand those validation methods, establish audit procedures that do not exist right now, unfortunately.

Because we certainly want to make sure that we don't increase carbon moving forward. I mean, I think we'd all agree that palm oil from Malaysia is far different from soybean production in California and leading to certain, you know, greenhouse gas at total cycle, fuel cycle implications.

And of course we appreciate the complexities of the land use and don't have a lot to observe there. But the N2O emissions that do come from soils potentially are an important part of the total calculation. So while that may not be a first order, feasible part of the methodology that that's part of the reason why starting carefully is so important.

To conclude I think what we'd like to observe is that this is a very powerful, general idea. The details are absolutely crucial, of course. And we think that the regulatory experience of the Air Resources Board coupled with certainly the experience in the assessment area of the CEC are going to be very important. And that we certainly look forward to participating vigorously and cooperatively with ARB as they develop the details.

I would want to say also that as an important caveat or just observation that it was noted on slide number 23 that the low-carbon fuel standard would supersede potentially the refinery emission controls. Assuming that that means local air district refinery controls. We certainly have perhaps the world's most stringent controls in that area and I assure you that we would not, you know, appreciate or support any effort to relax those. We get very serious and credible community concerns about tightening those standards, frankly.

I guess to conclude, the power of this idea at the moment, the low-carbon fuel standard idea, is ultimately to be judged in terms of the precision of our measurement methods, the validity of our audit data, and our ability to bring this modeling data to the point where we have a very high degree of confidence that as we proceed in germinating different incentives for capital investment that those capital investments are done with the greatest degree of cost efficiency and carbon efficacy.

Certainly the goals are profound. We accept fully the imperative to try to avoid the tipping point that we're all worried about in terms of the carbon. We testified just several days ago at the EPA hearing in strong support of the ARB's waiver request, noting that our air basin has the highest degree of ozone vulnerability to greenhouse gas emissions of any air basin in the nation. We have the highest ozone design value, for example.

So there's many reasons why I think that we are a strong partner and support the direction. But I did want to emphasize that it is certainly somewhat premature to talk about a joint performance standard before we get through the details on the individual segments. But I appreciate that and look forward to working with all of you as we move forward.

PRESIDING COMMISSIONER BOYD: Thank you,

Paul. You and I go back -- Well I guess I go back a little longer than you do in the alternative fuels area. Let me make a couple of comments on what you said. First with regard to this being the greatest thing since sliced bread.
Dr. Sperling, as you know, is one of the world's best politicians so I think we can take that into account.

Secondly I am going to ask you a question about light duty diesels, your concern about light duty dieselization of California and I don't know whether that will or won't happen. But if people do get interested through pure market forces in light duty diesels might not we start pushing for things like renewable diesel and biodiesel rather than regular diesel to address your concerns about emissions as an approach to that.

Secondly or thirdly, the statistics in you quoted in your declaration of emergency, and LA just reminded me of the third leg of the stool that got referenced earlier today and the earlier references before Dan came in the room about land use and transportation planning integration being the most neglected thing. Whereas this Commission has tried to address it but it gets fairly ignored and the Chairwoman is addressing it boldly in the 2007 IEPR.

It just seems to me that the dilemma you find yourself in in your basin, the worst in all of the United States, would be a real clarion call for your board of all to really start to pursue that question. Because while the district may not have authority most of your board members are local elected officials who do have that authority.

And I think original sin in the environmental area has been piss-poor land use planning in California for decades. Here is an opportunity, a horse to ride, an excuse, a mandate or something to have your board look at that as well as pursuing a mobile source answers. So just something to leave you with to take back to your managers.

MR. WUEBBEN: I certainly will and I greatly appreciate that, Chairman Boyd.

PRESIDING COMMISSIONER BOYD: Thank you, Paul.

DR. SPERLING: And could I just clear the record on one thing that Mr. Wuebben said.

Nothing I said or anything we ever proposed will suggest in any way any impact on air pollution, any worsening of pollution. Anything that happens must meet -- should meet, must meet vehicle standards and other standards. So we're not --

You know, I'll say the mantra, no backsliding. We believe it. And the thing about superseding. If that's on the slide, I don't think that's what we meant about refineries. Because there is no intent at all to say anything at all about increasing criteria pollutants from, from refineries.

MR. WUEBBEN: Well it does, of course, say possible approaches include LCFS supersedes all other caps, and in parentheses, refineries and others.

PRESIDING COMMISSIONER BOYD: Gentlemen, you have 18 months to debate that over at the forum known as the ARB and Board Member Sperling. So in the interest of lost time I'm going to you ask you to wrap it up.

Are we done with public, any other public comment? Tim, you've really got to get this thing moving.

MR. OLSON: Yes. Okay, we're going to

move back to our schedule for the XTL, Gary Yowell. And if his panel members are still here they can come up to the tables.

MR. YOWELL: I don't believe I see any survivors at this point. Okay, if the first one wasn't fast enough this one will be even faster.

I'm here to talk about gas-to-liquids, coke-to-liquids and petroleum coke-to-liquids. Again the key issues are the demand, the crude oil prices and how those will impact the timing and availability of gas-to-liquids, which will come from the world supply, coal-to-liquids, which can come from a national supply, and petroleum coke, which it would be California, a California supply.

Looking at incentives to grow those volumes. We're looking at 25 cents to $1 a gallon incentives with monetary and some non-monetary incentives were considered.

A brief introduction. The coal-to-liquids, natural gas-to-liquids and petroleum coke-to-liquids are three of the five items that can go through a Fischer-Tropsch reaction process and be gasified or converted to a gas if they are not already one before.

Cleaned up CO2 can be removed, has to be removed to protect the Fischer-Tropsch reaction process. And out the back end comes ultra low sulfur diesel right about here and Naptha.

The interesting thing is no matter which of these five we put in the front at the back end you get the same high quality at the back end. A very high quality, a very pristine fuel.

You've seen this, seen that, seen that again.

The opportunities to use XTLs can displace probably half of this growing demand for fuel.

You've seen that, seen that.

It gets to the point of availability of supplies. There's some published results out there from various EIA and journals and what-not and those are the white areas shown here in this low reference and high price scenarios. The gray areas represent areas where we don't have a reference to the date or the volume or both but there is a placeholder at this moment.

This is a graphic illustration about what we see in the literature and what the table before shows. And the green sliver shows the demand that we would project if we were to use a three billion gallons of future fuel from this area.

The top, you can't even see it, it's a little sliver, and that's the petroleum coke. Basically the coal-to-liquids and the gas-to-liquids look like about a 50/50 supply. This is the reference price scenario and here is the high price scenario. A different, higher volume. Mainly on the coal side.

The uncertainty that we're dealing with on these fuels is the greenhouse gasses. The literature shows gas-to-liquids plus or minus ten percent on a lifecycle basis for greenhouse gasses. The coal-to-liquids and petroleum coke-to-liquids, they're nominally a 200 percent increase from refining levels without sequestration applied. With sequestration you can match that of conventional refining typically.

There's been two propositions put forth, one by the Princeton Environmental Institute of Princeton University where they estimated about 36 to 43 percent coke feed with biomasses would be an opportune way to zero out the refining or the up-front to tank greenhouse gas emissions. And that it would be economically plausible with a $30 a ton greenhouse gas and a $50 a ton crude oil. That's the reference price or high price scenarios that we looked at.

The baseline, we're anticipating that less than five percent of California's demand long-term would be met with XTLs. We expect the GTL supply to go to Europe and to the Pacific Rim countries and to the East Coast. They're closer, cheaper to get to and markets are readily acceptable to those.

The coal-to-liquids we put out would go to other nearby states. It would support Nevada and Arizona as well so that has some ancillary benefits to California since we do the coke supply, our refiners do supply those markets as well. And some of those CTL could come to California.

And then the Pet-Coke we would put on the baseline scenario. We would assume that those would be continued to be used as a solid fuel for some Pacific Rim countries.

The alternative scenarios we looked at were again, monetary incentives on a per gallon basis, and non-monetary issues such as facilitating siting of petroleum infrastructure at the ports and the bulk storage. Similar to the renewable diesel stuff.

And some incentives for producing these unusual coal-to-liquid or petroleum coke-to-liquid plants. The coal-to-liquids plants have a distinct disadvantage of being highly capital-intensive and high risk at this point, even though we have high oil prices at $60 a barrel. But these require typically 18 years or so to pay off and it's a gamble to put a couple of billion down on the assumption that crude oil prices will remain at those high levels.

The weakest link of our analysis at this point, and we welcome any additional help in this regard, is guesstimating or estimating the supply of coal-to-liquids, GTL-to-liquids and pet-coke with various incentives applied.

The world market for diesel demand has grown rapidly since mid-2000 so it really makes our confidence very shaky at this point. But nonetheless for -- I'd like to show you here what this is showing here. With our referent fuel price scenario we're looking at a zero incentive that we'll get around two percent using California. That would pretty much be like for turnarounds for refineries and other unanticipated uses but not necessarily as a market use. And we're looking at various higher incentives that would grow that displacement level.

And this is the percent of world supply that we would be pulling from. We did that exercise on the low and high reference prices. We did it for the GTL and the CTL and for the pet-coke as well.

We used the same model as described earlier for uniformity. Uniform results as I showed earlier. This is specific to XTLs with a $1 a gallon incentive at a 28 percent penetration level in the year 2030. And that basically means keeping current diesel demand flat until 2030 at that percentage.

And cost-effectiveness about equal. It's interesting about these fuels, the renewable fuels and XTL fuels. The cost-effectiveness is fairly proportional to the amount of investment per gallon basis. So you put a $1 a gallon incentive, in this regard you get about a $1 a gallon cost-effectiveness for petroleum reduction.

And the NOx emissions and all the other emission reductions are fairly expensive in the context of historic perspective because we're down to the weeds on emissions, on criteria pollutants. And greenhouse gas emissions are in the $730 range. This is at an assumed ten percent greenhouse gas reduction. We're waiting for the updates, the final numbers on the XTLs.

Here is the annual emission reductions and greenhouse gas reductions and petroleum reductions from the model at a 28 percent penetration level presumed.

And as before, here is the results on a petroleum reduction basis for your three fuel prices and various incentive levels shown on the bottom for the five milestone years.

And we show it for petroleum reduction and we show it for greenhouse gas reductions. And again I left off the million tons here on the greenhouse gas reductions.

Staff recommendations are first and foremost, lack of bulk storage sufficient to receive shipments from abroad. We're hearing it time and time again and even through the permitting process.

Lack of sufficient market demand for XTLs. This is mostly for the petroleum coke-to-liquids that are -- they would be -- if built in California would be a small plant to use all that the two refiners, the Northern and Southern California refiners of coke, they would have to bring it most likely to like a Bakersfield area, build a plant there. Sequester the CO2 in the enhanced oil recovery system that is already in place. But that would still be a very small refinery which would need some assistance getting funded.

And then of course -- One interesting comment we got from some major oil companies in the area was the need to develop a sequestration framework from government that would help them move forward on coal-to-liquids and gas-to-liquids. So that was an interesting comment we got from them. They were very willing to work with us on that.

And the high risk for building petroleum coke-to-liquids and biofuel plants.

An interesting thing we observed with the Western Governors Association's team and other comments was that you can't really envision building a coal plant in America because of the greenhouse gases and you can't really envision building a biomass-to-liquid plant because of the economics. But if you marry the two together, they can see a way to getting the economics down and the greenhouse gases to a level below the refining levels today.

And that's what I have. Any comments, questions? Thank you.

MR. OLSON: Thank you. Okay, we'd like to now go into the next, the last session on the scenarios which will be the ethanol. And there will be two presentations, one by Mike Jackson and then right after that Bryan Jenkins from UC Davis. The panel members who were invited here, if they would come up to the table. They're welcome at this point.

MR. JACKSON: Okay, continuing along in the lines of, I guess this is the last scenario analysis on the fuels. I want to talk a little bit about ethanol. And generically talk about -- it could be biofuels though when I say ethanol. You could be thinking more of like, a more general term than just ethanol.

This was a joint effort between us, the staff at TIAX, and the staff at CEC with McCormack helping out. I want to go through a little bit.

Methodology here to start with. Kind of an overall summation impact. And then talk about three sort of different strategies. Low-level blends, typically what we think about like ten percent, an E85-type strategy and then maybe a hybrid, which I call a mid-level blend. And then finally I just want to add on to that is there is some product out there that's putting ethanol in diesels. We'll talk about that too.

So methodology. What I am trying to do here. These strategies are really aimed at the light duty fleet except for the last one. Both in terms of the legacy fleet, that is those vehicles that are out there already, as well as new vehicles.

And the goal here was to try to estimate possible ethanol and biofuel scenarios and compare the effectiveness of these strategies relative to low-level blends and FFV, flexible fuel vehicle, E85-type strategy, and FFV mid-level blend strategy and E-diesel.

What I am going to show you here today is primarily the estimated GHG benefits that would come from these strategies and we can kind of compare them and contrast them. And the gasoline displacement or diesel displacement.

And I have provided some ballpark numbers for infrastructure and vehicle costs. In most of this the GHG emissions were from our Wells-to-Wheels analysis that came out of the Full-Fuel Cycle Analysis completed for AB 1007.

And I'm giving projected estimates for several scenarios depending on the ethanol strategy itself, either three or four analysis years. Some of these I have taken all the way out to 2050. Understand that's a huge extrapolation.

And the fuel use estimates are based on new car roll-in and retirement. It's a simplified model but it tries to account for that. And an estimate of what you're going to -- if you're using FFVs when and how much you would be fueling with the alternative fuel.

For the station/terminal investments I used an eight percent discount factor as opposed to some of the societal factors that other staff had used, a five percent.

Flexible fuel vehicles are the key to both, the two strategies of either E85 and mid-level strategies.

This shows you the overall impact. This

is millions of gallons of gasoline displaced now. So we're talking here two, four, six billion gallons compared to the gasoline numbers on the order of 14, 15, 16, 17, 18 billion gallons over the time frame we're talking about.

And what you see is E10, so that's a ten percent blend. And basically the blends are an immediate strategy. You put it in, it's a fill and go strategy. Put in the ethanol, it stays there. It doesn't really grow because the demand for gasoline is not really growing over that time.

Whereas if you look at the mid-level blends in E30 or in E85 and follow that with time you can see that you have to, the benefit grows with time as you roll in the vehicles, as you roll in the fuel. So those are contrasting, two different strategies and two different techniques.

If you look at it from a GHG point of view, this gives you the overall results again. Just to put it, this is tons per day, CO2 tons per day equivalent. And again the Pavley legislation is just for a comparison. It's 87,000 tons per day at 2020. So this gives you an idea of what these fuel strategies will give you compared to what the Pavley strategy has been estimating.

And what is shown here is what we have said over and over again. Ethanol is not just ethanol, it depends on the pathway you get it to ethanol. So I bound the problem by looking at say corn on the low end and cellulosic or sugar cane on the high end. And you can see again the blend strategies put you in the 10,000 to, depending on what resource you're using, 10,000 to 40,000 tons per day. Just simple 10 to 15 percent blends. Not quite that simple I realize.

The mid-level blends also get you into that ballpark once you get the fuel into the vehicles and the vehicles are using the fuel.

The E85 assumptions here, especially the high side, is unrealistic because it is assuming that all the FFVs all the time are using, for example, cellulosic ethanol. And that particular scenario is scalable by whatever your assumption is on how much fuel is being used by those FFVs. Probably a best case kind of issue is like assuming 50 percent. You have those numbers that are shown there.

So that's the big picture. Now let me kind of walk through each one of these things.

Some of the blending ethanol into

gasoline and using in existing vehicles is very effective strategy for displacing gasoline. Immediately, right away. You don't have to wait for the new fleet to come in.

You do have to be careful about designing or tailoring the blend stock, as our refiners know, for the percentage of ethanol due to increased RVP and other factors such as increased permeation emissions, which are going to be offset with the new revisions to RFG3.

It probably doesn't require anything on the vehicle side, at least at the ten percent. All manufacturers say the vehicles are okay up to ten percent ethanol.

What do you need to do about the higher? Can we go to 15 percent? Can we go to 20 percent? Well, you probably need to do some testing there.

And the infrastructure modifications. Dispensing equipment is probably good. At least the dispensers, the pumps, the piping is UL certified I think up to 15 percent.

I am not exactly sure about the underground storage tanks so maybe industry representative here could explain that. It may be only good up to ten percent, although there was a period of time where we were actually putting in alcohol-compatible tanks.

This shows the 2005 IEPR projections for gasoline. The top chart here is without Pavley, the blue line, which is the reference line, is with Pavley, and as I mentioned that is roughly going between 16 billion to 18 billion gallons with that projection. And then you can see in the bottom there are the 5.7, 10 percent and 15 percent ethanol volumes.

You blow that up at the bottom part and you see apparently we're doing about a billion gallons in California at 5.7. At 10 percent you bring that up to about 1.5, maybe going up to 1.8. And if you do 15 then you're up to about 2.5 up to 3 billion gallons. Quite a bit of -- Quite a bit.

The current supply is probably constrained. At least corn-based methanol is probably constrained at about 14 billion gallons US-wide and if California can capture ten percent that's 1.4. But maybe California can capture more than ten percent. Let's say we're lucky at capturing somewhat shy of 20 percent. That would put it in the two billion range.

This strategy is probably not supply-limited. There is probably enough supply, and building supply, for this to happen. Granted, we can't do it all right away in terms of the 15 percent blend.

Some more details on the numbers. This table shows gasoline consumption in million gallons, the ethanol consumption that goes along with that and then the gasoline displaced. Which was corrected for the energy difference between 10 to 5.7 and 15 to 5.7.

Corn and cellulosic estimates are shown for comparison as a bounding kind of issue. But it give you an idea that if you get to cellulosic or those pathways that are much better from an energy perspective you can, you can leverage that and you would need less gallons of ethanol to get the same GHG reductions.

I have already said the strategy is not supply-limited even at probably 15 percent but there is infrastructure that would be needed. Obviously we're at about a billion gallons now. To triple that would require some infrastructure investment.

And if you do go to something like 15 percent does that require station and/or vehicle changes. The guess is, not sure. At ten percent probably not but above ten percent, probably.

Ethanol in this market is priced on a volume basis. It's priced against gasoline itself as well as other oxygenates. This chart just shows you sort of the rough magnitude of where the prices are relative to each other. And this comes off the CEC website. This of course is corrected for the 51 cent credit.

Current and future incentives to perhaps boost production and economics of lending ethanol in gasoline.

I already mentioned the 51 cent blenders credit and up to $30,000 tax credit for facilities. I think it's a 30 percent credit up to $30,000.

That was authorized in the '05 EPAct; it will require reauthorization.

I guess this is a disincentive but from the perspective of producers it is an incentive to them that there is a 52 cent per gallon tariff on imported ethanol.

And another incentive of course is the renewable fuel standard, RFS. This is an EPA-run program which is currently at 7.5 billion gallons as a goal by 2012. The industry will crash through that probably sometime later this year.

Adding on to that is the President's goal asking for 35 billion gallons but most likely this is not all ethanol.

I have already stated that the corn-based ethanol production is around 14 billion gallons. If you're going to have more supply of ethanol then you're going to have to either be able to increase the yield, which some companies like Monsanto say is doable but surely they're not going to be able to double it, or you're going to have to bring cellulosic or other sources on-line.

The current US production is about six billion gallons per year and will exceed the RFS projected sometime this summer.

Okay, what about E85. I think we've been talking about sort of neat fuel strategies in and around this community and at the Energy Commission for many, many years. The idea here is that you would have a fuel which is different than gasoline and that would compete with gasoline in the marketplace.

It would include the OEMs offering flexible fuel vehicles and the fuel providers making the necessary stations investment to build the fueling infrastructure and then market and sell it.

I considered three bounding scenarios for this case. Business-as-usual where FFVs are pretty much static in the marketplace. Not doing much of anything. They're there because of CAFE incentives. You could speculate that those CAFE incentives in the future go away and there's really no driver to bring this into the marketplace.

Another scenario is one that has been in the press where GM, Ford and Chrysler CEOs have suggested that they would, that 50 percent of their new car production could be FFVs in 2012.

And then a wild guess or a wild scenario is that all vehicles produced, new cars produced are FFVs in 2012-plus.

On the fuel station assumptions, for the 50 percent, what I called the 50 percent Big 3. I assumed that FFVs would use, those that are out there in the population would use E85 25 percent of the time to 2011. And then because you do have this fast increase in terms of the number of new vehicles going on the road fuel providers would want to put these stations in that would convince at least people to fuel 50 percent of the time.

In the more aggressive up-line case, which I said could be scaled, it sort of follows the same thing of 25 percent but thereafter everybody that has an FFV uses the fuel 100 percent of the time. Clearly unrealistic but it provides a maximum.

This shows from top down the population in California growing from somewhat shy of 40 million today to over 50 million in 2050 using the projections of the 2005 IEPR. It shows the vehicle fleet growing from about 25 million to 50 million in 2050.

And shown on the next ones are the three scenarios where business-as-usual hardly moves anything. The 50 percent FFVs starting in 2012 turn out to be about a quarter of the fleet because the US manufacturers in California capture about 58 percent of the fleet in terms of passenger cars and light duty trucks. And then the 100 percent shows it going into the vehicle fleet in the out years.

The demand for the fuel. This is E85 now shown as compared here to RFG3 where RFG is fairly flat. You can see the building of the demand for E85 in the out years. And again this has to do with rolling in the FFVs, therefore rolling in the demand for the various vehicles.

And the overshoot here is because there is an energy difference between gasoline and E85.

All the numbers are broken out here. In comparison to RFG3 at 5.7. And, you know, sort of not surprising you'll see that it takes a while for these vehicles to roll in. Your new car fleet going into California is about 1.6 million vehicles per year.

And then that naturally flows that your E85 consumption builds as the vehicles go into the marketplace and ethanol requirement builds as you go into the marketplace.

And then you can estimate the corn or cellulosic GHG reductions associated with that.

I have thrown on here vehicle costs at this point, saying that for this kind of strategy we have typically seen vehicle costs in the $100 per vehicle. And you say gee, that's not very much. But by the time you start putting it into a whole bunch of vehicles you can see it adds up pretty quick so let's just pick the 2022 time frame. At 100 percent that's $1.8 billion. That's not trivial.

If we converted all the 9600 fueling stations in California to R85, and you wouldn't do this of course right away either, you would transition it in, you're talking about a total investment in the $2.4 billion range, assuming a $200K per station, 8 percent discount rate. So it is not a trivial cost in terms of the infrastructure or the vehicles for that matter.

So implementing such a strategy requires matching not only the vehicles to the fueling infrastructure, as we have seen in some of the gas use fuels, but this is also important here because you don't want to strand that station investment.

But you are also going to have to capture here now the consumers' willingness to purchase E85 instead of gasoline at each fill. So you set up a natural competition between gasoline and E85 in the marketplace.

You also have this issue of not necessarily being able to leverage the existing infrastructure. You almost have to start from scratch and go to a three-tank system instead of a two-tank system. And what I mean by that is typically it's more than one tank, of course two tanks. But typically these fuels, you have in stations now regular unleaded and premium unleaded and you mix to get mid-grade. So you really only have two fuels there that have to be segregated in different tankage systems.

Now of course you have diesel too so maybe it's a three tank, three system fuel.

Probably need at least 20 percent coverage depending on the number of FFVs in the fleet. We used to say in the old days with a dedicated fuel maybe you only need ten percent. But if you have a flexible fuel vehicle, again where the customer has the decision to make each time he goes, if it is not convenient to him he'll find a way probably not to go to the convenient station.

And then this competition issue on E85 pricing is important. The consumer is deciding at each fill. It really sets up the competition between gasoline. Then what are the value propositions for the consumers when they go there? Is it cost, is it performance? What is it? What is going to make him make that decision that he needs to fill up with E85 compared to gasoline?

And then the station equipment. Dispensers and Stage II vapor recovery are issues. I am not sure that you could develop a strategy that would be able to use the existing equipment that's in the ground tank unless the tanks themselves are compatible with alcohol fuels and could be cleaned.

Other considerations. There are some issues regarding the FFVs that have to be addressed. Ultimately they need to be designed to meet our toughest standards here in California and those will be the PZEV standards.

That's going to be a challenge relative to tailpipe as well as evaps. And that probably will require material changes. And I am not sure what that impact will be on vehicle cost but there probably is some impact.

Probably need to have the incentives in place for a number of years still both from a blenders point of view as well as from the station facility point of view.

The E85 strategy here surely is supply-limited. When we talk about the 100 percent case in the out years you're in the, you're in the seven/ten billion gallon range needed for ethanol.

I don't know where you're going to get all that, even with in-state production.

So there is a, there is a question about, you know, what are we trying to do here in terms of -- The E85 isn't the ultimate strategy. Are we just going to try to capture a little part of the E85? So what is the realistic upper bound?

Fuel availability at stations will have to be as convenient and mainstream as regular unleaded and other grades. My point here is putting these stations under the canopy, having them be in a dispenser that looks and feels just like the gasoline dispenser is important. In the old methanol days we had dispensers that were located off-island. Occasionally somebody would know about it. Occasionally somebody wouldn't know about it. That would not be acceptable for this kind of implementation.

Let me talk a little bit about mid-level. This is not necessarily an idea that we got from stakeholders. I'm just sort of brainstorming here and appreciate any kind of comments you guys would have on this. But the idea here would to try to minimize the infrastructure costs, changes and costs.

Instead of introducing E85, which would require, you know, really sort of a three fuel system, why not do something like an unleaded and a mid-level blend to maintain the two tank, two fuel system. So have a regular with or without ethanol, perhaps even at a higher octane rating possibly, and have a mid-level blend like E30 with a high octane rating and then you can blend to other gasoline fuels if you desire.

This could possibly leverage the existing underground storage tank systems at a station. Of course you would have to change out some of the other above-ground or pumps/dispensing equipment due to material incompatibilities. But should have lower station costs if, if, that's a big if, the underground storage tank's costs are not included.

So introduce and sell something like E30. E30 is just sort of a make-up. I mean, it could be E20, it could be E something else. And it doesn't have to be ethanol, it could be biobutanol. It could be some other molecule that comes from a bioresource into all new vehicles, okay.

So now instead of saying, flexible fuel

vehicles, all vehicles have to be flexible fuel. All the flexible fuel vehicles have to use the E30. So this is a leaded/unleaded type of transition.

E30 ought to be cheaper than regular unleaded since ethanol presumably will be priced on a gallon basis cheaper than gasoline. But, you know, it's by demand kind of considerations. There is no competition that sets up between the alternative fuel and gasoline. You're getting the biofuels into the gasoline.

The FFVs would be required but you could also optimize them around whatever that blend is. And if you decided that you wanted to increase the amount of biofuel in the gasoline it is conceivable you could design your system such that you're sort of matching what the available production is and increasing it over time. But keeping the flexibility in the vehicle so you wouldn't have to go back and re-turnover all the vehicles again. So it would be flexible in a sense but maybe not as flexible from zero to 85.

What do you get if the assumption was E30? Well here's what you get. Again you see sort of growing. With the 50 percent here you would get roughly around five, five billion gallons. If it was all vehicles and it was E30 the fueling demand, the fueling consumed would be around, very similar because there is not much of an energy penalty between an E30 and an E5.7.

The type of methanol -- ethanol consumption that you're talking about here still gets a little iffy. You're in the seven billion gallon ranges in these, in these out years and that would, that would be a stretch a little bit. You could say, you know, we could probably get from the US side three billion gallons. And maybe we could do three billion gallons of in-state production so we're getting in the ballpark.

The GHG reductions, as we saw before, will depend on how fast you implement the fuel, of course, and how fast you phase it in and how fast the vehicles are to use. Sort of the same implementation strategy.

The vehicle costs here are probably about the same.

If we could leverage the underground storage tanks maybe you could reduce the station costs by a tenth of what you would have relative to E85.

So what are some of the possible pluses and minuses here? This kind of strategy would eliminate the competition between gasoline and ethanol. A two tank/two fuel system versus having a three tank/three fuel system.

Could move ultimately to a one tank system as the older cars turned over, in fact.

Plus there is the potential of having a higher value, having a higher octane design in your cars that would have better fuel economy associated with that higher octane rating.

Potential for lower infrastructure costs but that's a big if. It depends on the underground storage tanks.

Blend components don't have to be ethanol here. They could be biofuels-derived like biobutanol or other to be defined.

The strategy is probably somewhat blend component limited, as I said. It's a stretch to think about things that are going to be above six billion gallons in California.

Implementation of the blend could be designed to match ethanol or blend component supply. Obviously there is a cost associated with doing that from a refinery perspective too.

Okay, finally I want to just touch on ED sold. O2 Diesel has a diesel-blend fuel in the marketplace today. It's 7.7 by volume percent of proprietary additives in the .6 to 1 percent range. They have some verification status.

We looked at two different scenarios, a moderate growth and a higher growth.

There's a lot of factors that would affect the success of this in the marketplace. Tier II health effects testing funded and outcome positive.

Engine durability no different than what is currently happening with diesel. These are sort of all big ifs.

And ASTM standard developed.

And you still get all the results in terms of emission results that are positive with these kind of blends.

But given that, what would you get with these two scenarios? This is primarily a centrally-fueled strategy, it's not mainstream. Either going to be on-road centrally fueled or off-road centrally fueled. And you can see that you're talking about -- these are millions of gallons. Sorry it's not on here but these are millions of gallons of diesel displacement or ethanol volume. So, you know, you're talking four, five, ten millions of gallons. Not huge but, you know, again we're looking for all the silver BBs I guess we can find.

With that I'll close and open it up to questions.

MR. OLSON: Okay. What we'll do is go to the next presentation. Bryan Jenkins from UC Davis will give a presentation on in-state biofuels. And then we can have questions on the ethanol.

MR. JENKINS: It's a pleasure to be here this afternoon before the Commission and the Board. I'm Bryan Jenkins, I'm with the University of California at Davis. I'll talk a little bit about some of the supply considerations in looking at ethanol and other biofuels.

I had the pleasure of having the responsibility for pulling information together for Section 4 of Part 1 of the Low-Carbon Fuel Standard Report on resources for California's supply. Dan Sperling here talked earlier about some of the issues in that report and we certainly have a lot of supply issues to be concerned with in looking at the low-carbon fuel standard.

Dan also mentioned not burdening that standard with some of the sustainability issues. I will make a comment right up front here that if we begin down the path of major expansion in biofuels development in California this issue of sustainability is going to be a major issue that we will need to deal with up front. And I think that should become clear. So with that I'll just move along here.

I'll put this probably infamous slide up here again. Many of you have see this before. This is California, of course, and the distribution of vegetation across California, basically. Looking at the residue and in-forest biomass resources for the state. This is based on an assessment that the California Biomass Collaborative put together.

The Collaborative, as you know, is a state-funded organization primarily from the California Energy Commission that brings together industry, government, the environmental community and academics. People, representatives from all those sectors to look at issues in sustainable biomass for the state.

So if we look at the three major categories of resources in biomass for the state these are agriculture, forestry and the urban sector. Of course, urban, the primary resource there is in municipal, solid waste.

And if we look at the total annual production of biomass from these sectors, it runs somewhere around 80, 80 million tons. There's some uncertainty in that number of course. We are not going to use all of that on a sustainable basis and preliminary estimates would put that at somewhere between 30 and 40 million tons that we might actually use.

We are doing some work now under the Collaborative Work Test for the present year to try to investigate this in more detail. Look at both the economic potential, which these blue bars here which look at the technical feasibility, but don't necessarily address all the economic issues. Nor do they necessarily address all the sustainability issues, which will impact this number.

And just to remind us that we do have multiple pathways to get to biofuels and different types of biofuels. Not only biofuels but bioelectricity, electricity from biomass. We are already doing quite a bit of that. There's still some more to be done under the goals that the state has with the Bioenergy Action Plan and Executive Orders there.

So we have multiple pathways to get there. And these pathways will influence both the amount of resource that we need to bring to bear on the issue as well as the production of the products that we're all interested in driving around on.

And just to elaborate on that, we do have different bio-refining approaches, which will influence both the supply as well as the product markets. And these are primarily in the areas of thermochemical and biochemical conversion using thermolytic approaches or hydrolytic approaches to take biomass apart and put it back together again the way we need.

And we can produce many different types of biofuels. There is of course ethanol but we can produce hydrocarbons, mixed alcohols, butanol of course is a higher alcohol, synthetic natural gas. We can look at hydrogen, ammonia and many different fuel products. So these will influence the supply that we need to develop, both in the state and that we will need to access from outside the state.

Some of you, again, have seen these numbers as well. If we look at these numbers of 30 to 40 million tons a year, dry tons a year available from the residue and in-forest biomass that we have in the state. Looking just at the biochemical or thermochemical approaches we're probably looking at about 1.5 to 2 billion gallons a year gasoline equivalent potential in that resource. And of course we have a fair amount of electricity in that resource as well.

The Collaborative has also put together scenarios for development. This is just one scenario that we might look at. This considers a fairly rapid expansion in biofuels production over the fairly near term out through 2020. Looking at developing somewhere along the lines of 1.5 billion gallons of gasoline equivalent in biofuels.

And of course we have various opportunities for making electricity instead of biofuels or biofuels instead of electricity. We have biomethane that will be produced and we can do much more than what we're doing now. We also have the potential for hydrogen production. The question would be, where might that hydrogen come from? Well it can certainly come from biomass as well.

And if we look at a hydrogen economy developing then we might wonder what biomass is going to be used to produce that share of hydrogen. And it might be that it would be coming from biofuels as opposed to, as opposed to electricity, for example. So those are various scenarios.

We also have quite a bit of biomass currently in use in the state. We have about a gigawatt of power generation, which is using close to five million tons a year of biomass. You can see the distribution there among the forest materials, the urban woods, the ag and forest processing materials. Sorry, the ag and food processing materials and municipal solid waste. We're not using a lot of solid waste for electricity generation at present. That's an issue that will come up I think in the near term, actually, as to what we do in that regard.

If we just look at where the biomass is

distributed across the state and try to think about economies of scale and developing biofuel facilities this is just an indication to show we're looking to produce somewhere around two billion gallons a year through about maybe 20 plants.

Of course we might have many plants than this, we might have fewer plants than this. The people in this room who are developing plants of different sizes than what I have assumed here. But we just looked at about 100 million gallons per year as a facility size. There could be multiple facilities in the region.

You can see the distribution. It is, of course the forest biomass is located primarily in the northern part of the state, agricultural biomass down through the center of the state through the great, Central Valley mostly. And of course the urban resources in the metropolitan areas of the state. So this is intuitive. I haven't shown Imperial Valley on here or other places where we might be producing energy crops so that will come up in a bit.

You've seen some of these numbers already, Mike talked about this just a few minutes ago. But if we look at some of the production goals for biofuels in the state, if we were to look at say an E5.7 for example, about where we are now in terms of blending, that's that red line on the top graph on the right.

You can see we need somewhere around a billion gallons a year out by 2050 of in-state production under the Governor's Executive Order and the goal for producing 75 percent of the biofuels we use in-state by 2050. And you can see if we go to a renewable fuel standard that would look at an E20 or something like that then we're up above three billion gallons a year in-state production for that, that goal.

Similarly for diesel. If we look at renewable diesel production in 2050 about a billion and a half billion gallons per year in-state production would be required under a renewable fuel. I'll call it R20 or B20 as it's sometimes referred to for biodiesel. It could be other renewable diesel. But we have substantial amounts of biofuel that would be required under those scenarios.

Also we have these greenhouse gas reduction targets, which you talked a little bit about today. I'm sorry I couldn't make all of the morning sessions. But we have quite a task, quite a task ahead of us. And the low-carbon fuel standard of course looks at some of this but there are other programs including this one that we're addressing today.

Let's look at trying to reverse this trend that we're in right now of increasing greenhouse gasses and turn this around so that by 2010, you know, we're back to our previous levels. And then 2020 and so on down to 2050 where we are 80 percent below our 1990 levels for greenhouse gas emissions. And this is a significant opportunity but it also requires a significant effort both in research and development to make this happen.

If we were to look at some of the scenarios under this for blending levels and fractions of biofuels to meet these greenhouse gas reduction goals in transportation, assuming that transportation takes on an equal share of the greenhouse gas reduction out of the total statewide requirement. Which it doesn't necessarily have to do, of course. We might do it through other sectors as well.

But if we just looked at what the greenhouse gas reduction goals would be. They would be for 2010, under a high-demand gasoline scenario we'd be looking at about a seven million metric tons per year reduction. When we get up to 2050 we're looking at 165 million metric tons of CO2 reduction or greenhouse gas emission reduction for the state. Under a lower demand scenario with some greenhouse gas standards in there, even so by 2050 we're looking at 130 million metric tons reduction that needs to occur.

If we were to do this all with biofuels, and I am not suggesting that we would do this all with biofuels but just for an academic exercise here to look at what the requirements would be in the way of biofuels production. I know if we were to look, say for example at 2050, under the high demand scenario for gasoline with about 80 percent fraction in there using an E85 -- I'll show you what the production levels would be to do that. We could meet that greenhouse gas reduction target.

Similarly for the R100, actually replacing all of the fossil diesel with renewable diesel out in 2050. So if we look at numbers like this, the actual production requirement or supply to meet those would be something like 26 billion gallons per year total ethanol and renewable diesel for in-state production and then we would be looking at about 20 billion gallons a year total production. And you may have discussed these numbers earlier today as well.

So where are we going to get all this if we're going to do something like that? Maybe we wont do that but we'll do something less at least. If we look at the major crops grown in California at present that might contribute to this, rice, wheat, corn, sugar beets, barley, sorghum and oats. These are some of the major crops.

We have a lot of crops in California, more than 400 crops I think, and some of these are specialty crops, don't occupy much acreage. But the big acreage crops here, looking at ethanol yields. And the precision of these numbers is probably too high. But looking at gallons per acre that we might produce, somewhere between 100 and 400 gallons per acre coming from these crops.

Of course there is an issue here as to whether we use these crops for food or for fuel. But just looking at the acres harvested in 2005 we're up over a million acres in just these crops with a total ethanol potential of somewhere around 360 million gallons. And if we were to use the maximum historical acres planted to these crops and look at the production there we'd be up about 1.2 billion gallons of ethanol equivalent from these, just these crops.

There are many different bioenergy crops that we might produce in addition to the agricultural crops, the more conventional agricultural crops. Cereals of course. We can expand corn production. This is what's happening in the Midwest. For example, corn is going into more fuels than feed at this time.

There are price impacts of course with that as we're all aware.

Just looking at the corn that's coming in for animal feed in California right now, the amount of that corn would be sufficient to produce about 200 to 450 million gallons of ethanol under some preliminary estimates. There are some in this room who are taking advantage of this right now I think.

And there are some advantages in trying to insert a biofuel step into the whole feed chain. There are some disadvantages of that and we have to be aware of that and pay attention to some of the emissions that might occur and make sure we're doing that sustainably but there are some potential advantage to do that.

In terms of oilseed crops. We have a lot of land in the state which is in need of remediation. We have salt affected and drainage affected lands. For example, we have about 1.5 million acres in the San Joaquin Valley that are drainage affected. We could be planting biomass to help remediate a lot of these lands.

If we look at some of the oil crops that could go in there. But of course oil crops are grown currently in the state and can be grown many other places besides the San Joaquin Valley.

But just looking at some of the yields and what we might get out of here. Some of these crops are fairly salt tolerant so they can grow under the fairly harsh conditions that we would need to remediate some of these salts. So we could be producing a fair amount of biodiesel crops in the state.

Also sugar crops. We have grown historically sugar beets. The production in sugar beets has varied quite a bit. It's gone down, it may come back up under high fuel prices as growers plant sugar beets for biofuels. Sugar beet yields have certainly gone up over the years so that we're now somewhere in the order of 40 tons per acre root yield from sugar beets.

Sugar cane. There has been quite a bit of discussion of sugar cane as a bioenergy crop for the state. I just got off the phone this morning with somebody who wants to plant sugar cane in the Delta now.

Most of the trials with sugar cane in California have been done in the Imperial Valley. Data there suggests yields of somewhere around 18, possibly up to 30 dry tons per acre per year. And I'll show you an example here on some of the biofuels that might be produced.

Sweet sorghum has also been investigated as a crop for the state. The California Department of Food and Agriculture did quite a bit of work in the late '80s, early '90s on sweet sorghum production. So it has some agronomic properties which are perhaps preferred than some of these other crops and might also contribute to biofuels production in the state.

If we look at sugar cane as an example. In the Imperial Valley the test plots that we have had there suggest yields of about 1200 to 1400 gallons of ethanol per acre per year coming off of that.

There is also the potential to be producing another 400 to 700 gallons from the cellulosic part of that, the bagasse that is left over from extracting the sugars which would be producing the 1200 to 1400 gallons there.

With 500,000 acres of cropland or thereabouts in the Imperial Valley currently under cultivation, if we did a 20 percent crop shift to sugar cane in the Valley that would be sufficient to produce about 200 million gallons of ethanol from that crop.

Crop shifting is of course a controversial issue. It's not something that we do lightly. The economics will play some role in that of course but there will be sustainability issues that will come up in this discussion. There will be other issues, as we have already seen with corn prices going up.

I understand that for the German Oktoberfest this year the price of beer is scheduled to be up about $10 per liter. With $40 a gallon on beer I guess that's a good price for ethanol. So crop shifting -- And this is because of the crop shifting that is taking place under the biofuels directive in Europe, which is restricting some of the barley production and hops production for beer making.

Some estimates looking at sugar cane in the Valley. You get this ethanol yield up to 4,000 to 6,000 gallons per acre per year. That's a very high estimate. Water may become a constraint. The sustainability impacts may become a constraint as well, some of the agronomics. But there are people here who probably can speak to that and have direct experience in the Valley with some of these trials.

Just looking at land area required for different biofuel scenarios. If we look at corn, for example. If we were to go to say an E20 for corn for in-state, ethanol production goals we're looking at about seven million acres involved in that production. We currently have nine million acres of irrigated agriculture in California so you can see that this is a fairly substantial impact on agriculture in the state.

And you can see the other impacts there as we look say an R2 up to R20 or a B2 up to B20. If we wanted a B20 with in-state production under the conventional crops that we have, the oilseed crops that we have, 14 million acres, 15 million acres of land required to do that. We use a lot of fuel in this state.

Other bioenergy crops, we have forages and grasses. Cellulosic crops that can both contribute to remediation of various soils but also provide supply so there's lots of work going on there. High yielding grasses and the like that are salt-tolerant that could be grown in the San Joaquin, for example.

Tree crops. Many tree crops that have property relevant to production in California. We have seen some development in Eucalyptus, Athel or Tamarisk, Casuarina and other tree species like that. Poplar, heavily research in the US. We're beginning to see Poplar in California as well.

Algae is a potential crop that has come back and is receiving substantial attention because of the potential yields, biofuel yields off of algae.

If we look at production opportunities

the DOE's Aquatic Species Program which was run from 1978 to 1996 and did extensive investigation of algae and biodiesel production from algae in particular, looking at yields as high as 50 grams per square meter per day, or productivities that high. That basically equates to about 8,000 gallons of biofuel per acre per year. That is what that number relates to. If we want a billion gallons we could do that on about 125,000 acres of algae. So the production potential is very large from algae.

There are horrendous engineering hurdles to overcome in trying to produce on that scale. So as we look through the Central Valley becoming another inland sea again, growing algae to meet our fuel demands, then we're going to have to recognize that we need to harvest that material. We'll need to do all of the engineering and processing required to extract lipids to convert the carbohydrates to the various biofuel forms.

Okay, let's try to get down to the cellulosic ethanol potential for the state. Just running through the different categories that we think might be used and the amounts that might be used. Field and seed crops. Things like residues from rice straw, wheat straw and the other fuel crops. Orchard and vine crops.

Mixed paper. That's non-recyclable mixed paper coming out of the municipal solid waste stream. Landfilled wood and greenwaste. For example, moving ADC, alternative daily cover. Instead of putting it directly into the landfill and giving credit, diverting credit for it we might extract some energy from it ahead of time. Although we get some energy from it as landfill gas eventually.

In any case we look down through these. And maybe 1.5 million acres dedicated to energy crops and looking at various yields from about 5 on up to 9 tons per acre per year on average across those lands. We might come up with somewhere between 1.6 nd 2.1 billion gallons of gasoline equivalent from those resources. So these would be in-state resources and that's sort of the level we're at.

So for 2020, just looking out that far in terms of the goals that the state has for greenhouse gas emission reductions and biofuels, in-state biofuel production.

We might be looking at in-state

resources producing somewhere between two and three billion gallons per year of gasoline equivalent. And we can probably do this. We can meet these goals.

There may be some crop shifting that is required to do that.

We may be doing some biofuel importing.

We may actually import biomass. We import biomass actually in the form of what we throw away as municipal solid waste. A lot of that biomass comes across the state borders as packaging and other materials.

So we have opportunity to meet these goals for biofuels.

There are, of course, sustainability effects that we have to be cognizant of and have to deal with and we actually have to define, as part of the collaborative mission as well as -- if you're read the roadmap that the Collaborative developed last year there is in there the distinct notion of defining sustainability standards for biomass development and this is something that I think needs to occur in the near term, not out in the later term.

The technology deployment to do all this is somewhat uncertain.

If we go out to 2050 the projected in-state biomass resources are clearly insufficient to meet these goals. So we will not be meeting all the greenhouse gas emission reduction goals simply by biofuels. Not unless we do something very major to change the existing resource structure.

This would be looking at about 200 million tons a year of biomass produced at 20 billion gallons per year of biofuels. So this is going to require substantial, supplemental biofuels or biomass support.

And again, this issue of sustainability is going to come up. Where do we get the material and is the supply sustainable? I'll stop there and thank you very much. I'll take any questions.

PRESIDING COMMISSIONER BOYD: Thank you, Bryan.

MR. OLSON: Okay, are there questions or comments from any of the of the industry groups here or from the audience?

MR. JESSEL: Al Jessel from Chevron. Mike, I guess I was originally going to be part of a panel.

MR. OLSON: That's right.

MR. JESSEL: I guess we cancelled --

MR. OLSON: We changed the format.

MR. JESSEL: Cancelled the format, okay. Okay. In which case I won't get on my soapbox in the interest of time.

I just want to draw everybody's attention to one think that Mike Jackson put up here, which I think is really important to us. We have been suffering along for a number of years thinking that there were three types of gasoline, there's an E0, an E10 and an E85.

And I just want to congratulate Mike for putting a couple of other options on the table, which I think we should all be looking at. He's put out E15. We've got to break the E10 barrier somehow if we're going to comply with the low-carbon fuel standard, at least from a refiner's standpoint. And we need to consider the best way to do that.

I especially like the scenario that he sketched out for an E30 because it does a whole bunch of things. It more carefully matches the capability of the country, the state, whatever geographical area you want to look at, to the actual ability to produce the ethanol that would actually go into the gasoline.

It is just unreasonable to think that we will ever produce all of our gasoline as E85. There just isn't that much production capacity out there for the ethanol that would be required. At the same time E10 is not enough. We're going to need to be able to put more than ten percent ethanol concentrations into vehicles.

I think the big issue here is transition. How do we get from where we are right now to what I believe is the final ending point. Which Mike alluded to and that is really a single fuel. A single fuel, EX, EMORE, whatever you want to call it, that has to be figured out. And in that way we can get our fuel system down to a single fuel. We don't need two or we don't need three, we just need one ultimately.

And this is a bunch of years out. We need a transition scenario. But if we get there we have simplified the logistics system, we have simplified the whole boutique fuel system in the country if you want to extend it that far. Plus we have opened up the opportunity to actually optimize the vehicle.

I think one of the big problems we have now with flexible fuel vehicles is that it is not optimized for either gasoline or ethanol and we're sacrificing some energy efficiency here. That's something which will help us meet our greenhouse gas goals. So I think --

Once again I just want to thank Mike for putting those options on the table. And I want to draw everybody's attention to it and we ought to work a little harder on them. Thanks very much.

MR. DiCICCO: I have one question for Al if he's still available. This is Dominic DiCicco from Ford. I was curious on what your solutions would be for the legacy vehicles with (indiscernible)?

MR. JESSEL: Dominic, I am still here. My solution is to come up with a decent transition strategy. I think Mike also alluded to this. You may have to have, you know, the current fuel system gradually moves over to an EX. And it may take flexible fuel vehicles to do that for a number of years. But I think ultimately the flexible fuel vehicles can be transitioned to dedicated vehicles on whatever EX we do finally settle on. And I am not saying this happens overnight. Again, this is a long-term strategy.

MR. DiCICCO: Okay. I just wanted recognition that something, a strategy like that is going to take years.

MR. JESSEL: Yes. I agree totally.

MR. OLSON: Okay, any other comments, questions, on the phone or in the room here?

MR. REYNOLDS: This is Bob Reynolds with Downstream Alternatives. I just had perhaps a couple of comments. One back on one of the slides. I believe it was maybe slide nine or so where they were talking about the increased RVP and increased permeation.

With regard -- I just wanted to clarify that with regards to moving from 5.7 to 10. I mean, we've already, we've already endured those problems getting to 5.7. And there is, at least on the testing that has been done so far, no greater permeation. And the first year RVP really peaks out around three percent so the RVP doesn't go up anymore. The only remaining concern would be that the car predictive model shows a NOx increase going to the higher level.

The second point. When we were last talking about the cost of E85 infrastructure, and of course we used an example I think of 9600 stations, which is all of them obviously there would be if we used the 20 percent that hypothesized as what we need for market penetration. It would be much less than that.

But I do want to point out that there would be quite a bit of infrastructure investment at the terminal, and that wasn't mentioned, even if you switch over some gasoline tanks. Because of the energy density you're going to need about 40 percent more storage than the equivalent amount of gasoline and you may need additional blending capacity at the terminal level.

MR. JACKSON: Thanks for your comments, Bob, you're absolutely right. The comments on the page nine in terms of increased RVP and increased permeation emissions. I was thinking more along the lines what might -- obviously if you increase the amount of ethanol in the gasoline, if you increase it too much you may have to increase the RVG of the gasoline itself, such as an E85.

MR. REYNOLDS: Yes, that's correct.

MR. JACKSON: That was the context of that. And then I just hadn't had a chance to look at the CRC results, which we went through and did some testing on, you know, E0 up to E20. And I guess it is my understanding there would be some increased permeation effects at the higher blends but --

MR. REYNOLDS: But not on E10.

MR. JACKSON: Right.

MR. REYNOLDS: And also I would mention that at least under the current, the current regs and specifications there would almost certainly be a need to probably have some specialized blending for E85. And that you could probably, at a minimum have to use either natural gasoline ideally if you're mixing -- If you mix CARBOB with a 15 percent of a hydrocarbon you're going to have to add isopentane to get the volatility up to the minimum.

MR. OLSON: Yes Joe. Joe Sparano, you had a question.

MR. SPARANO: Joe Sparano with WSPA. Just a real quick comment. It strikes me after hearing all these excellent presentations all day a lot of them have tiptoed around or slammed into the issue of infrastructure. And I think here is a real case in the use of ethanol where whatever plans we lay out, whether they be near-term, whether they be in line with Al's long-term comments and ideas, everybody has got to take a step back and remember the enormity of the infrastructure issue here.

Sometimes you can't combine what we're talking about. If you have a 20 percent penetration of 9500 service stations in the state you can't serve them all the same. You have to have a separate infrastructure as long as you have conventional gasoline at some of them and E85 or E30 at others. I think --

You've got 14 refineries that make gasoline and umpteen terminals. I wish I new the number, I'd feel smarter, but I don't. But those terminals have hundreds of tanks. And then you have the 9500 stations with three tanks each, which is about 30,000 tanks and all the pipelines that feed back and forth. This is a substantial issue that together we'll have to overcome in order to make what appears to be a reasonable approach to converting to low-carbon fuels a reality.

MR. OLSON: And not counting the stations for the dedicated fleets either.

MR. SPARANO: Right.

MR. OLSON: Okay, if there are no other questions we're going to go on to our next presentation. I have asked the presenters to shorten -- One more question. Jon Van Bogart.

MR. VAN BOGART: I didn't so much have a question. I guess they cancelled the panel so I just wanted to put a couple of things out there. Jon Van Bogart, I'm with Clean Fuel USA and also the California Ethanol Vehicle Coalition.

Some of the things, you know, we have been working with the Air Resources Board on this for a couple of years and our hats go off to the Air Resources Board. They have been good partners in trying to get E85 on the street as far as on the equipment side and not, you know. With air quality issues and things they haven't circumvented that process so our hats are off to them for that.

A couple of things that are happening with the funding of 1811 now that it's out. There's going to be some guidelines for station openings within those grant documents. Three stations that will be opening this year, one will be in Brentwood and the other one will be in Carlsbad and another one at City of Riverside.

And we're going to use those stations as beta-test sites for certification through the CARB process.

So a lot of the equipment testing that has been going on at our facility -- also Wayne Dresser, Gilbarco, other companies. We're hopeful that these stations will finally get out and we'll get some real world numbers for the stations.

Some of the costs associated with infrastructure at the stations, just have some round numbers. Stations that can be augmented, retrofit existing pumps and existing tanks that are in the ground, those costs can run anywhere from $20,000 to $50,000. It is not just the dispenser and the components inside the dispenser, also inside the tank. That tank needs to be cleaned. The submersible pump, float gauge apparatus, any wet or vapor components in there that are non-compatible, those have to be changed out. So that can, again, run anywhere from $20,000 to $30,000.

For a new installation where a station is going to put in a brand new dispenser in a brand new tank. Depending on the district or region of the state those costs can be anywhere from $150,000 to $250,000 per station.

Just a comment on some of the mid-level blends. It is my understanding even though we're still -- UL is still pending but any blends over 15 percent, if you're going to go to an E10 virtually all those pumps and tanks would have to be augmented. And I think that's a financial hurdle that the industry probably wouldn't be willing to go down at this time.

So those are the comments I had.

PRESIDING COMMISSIONER BOYD: Jon, excuse me. You said E10, to go to E10 necessitates this change?

MR. VAN BOGART: Above E15.

PRESIDING COMMISSIONER BOYD: Okay, thank you.

MR. VAN BOGART: For UL.

PRESIDING COMMISSIONER BOYD: Right.

MR. VAN BOGART: And that process looks like -- I'm tired of predicting when UL will be on the street but it looks like fourth quarter this year they will reopen the process for the existing certifications that were pulled back.

And also we're partnering with the Air Resources Board and our equipment group to go through the UL and also intec process for certification.

PRESIDING COMMISSIONER BOYD: Thank you.

MR. OLSON: Okay, I'd like to go to our next speaker, Claire Vallotton. She is with Zetetic Associates and has done a study for us on how fleet managers see alternative fuels of those that use and do not use alternative fuels. So she is our next speaker.

DR. VALLOTTON: In the interest of time I am going to be rushing a little bit. I apologize if any information doesn't come through clearly but this report, the whole report s well as this presentation is going to be on the web for you to view.

I am going to talk very briefly about the goals and methods and go pretty much right to results. For both users and non-users talking about who is using or who is willing to use alternative fuels. What some of the barriers are, which you are going to be very familiar with, and some of the opportunities.

The goal was to identify and describe niche market opportunities among California fleets. And by that I mean commercial fleets. We do have some government fleets in our survey, respondents, but mostly this was focused on private business owners. And a fleet is just however many vehicles they use for that business.

We want to characterize their attitudes and perceptions that might be affecting their fuel decisions.

We did an on-line survey. We sent out invitations to fleet owners from the California DMV database. So anyone with more than ten vehicles, ten or more vehicles registered to their name got an invitation if the address was correct.

We had 1330 respondents so our data comes from that many fleet owners or operators.

And then we also did some focus groups to get some additional information.

In the survey we asked, are you using -- First we asked a basic fleet profile. How many vehicles do you have? What types of vehicles are those? What industry are you in? And then we asked, do you use any alternative fuels at all. If you answered yes then you went to a different track of the survey than those who answered no.

Alternative fuel users were asked which fuels they are using and in what percentage of their fleets. They were asked about the original motivation to begin using alternative fuels, about their satisfaction with their fuel experiences, different elements of experiences, the problems they have encountered, what they plan to do in the future. Are they going to continue using or not. And then what would get to expand use within their fleets.

Non-users were asked, are you willing to use? What would you be interested in using? Potential motivations that would get them to use or what would be important to get them to use. Their biggest concerns. And then the actions that the state might take or others might take to get them to begin using.

This is overall the percentage of fleets or the numbers of fleets in our survey that are using. So 87 percent were using no alternative fuels at all. There was -- So 13 percent were using. But as you can see with the big orange bar, that 74 percent of those who are using are using alternative fuels in only one to twenty percent of their fleet. So even amongst those who are using the usage is very small. That right there represents an opportunity for expansion.

Alternative fuel use among fleets

depends -- The likelihood of using depends on whether you're a government or a private fleet. Government is much more likely to use.

Also this slide shows you that the likelihood that a fleet is using any alternative fuels goes up rapidly as size of the fleet increases. It goes up to nearly 90 percent of likelihood of using if you have over 3,000 vehicles. But there's very few, very large fleets out there. Most of our fleets are in the one to twenty vehicle range. So we're really talking about small likelihoods of using.

So at that 20 vehicle mark, 62 percent of government fleets are using as compared to less than 10 percent of private fleets.

Alternative fuel use also varies by industry. And you can see it also goes along with size. But even accounting for size industries have different usage patterns. The most likely to use are those that are fuel-related. That's fuel supply or servicing.

Busing. That's people transportation in a bus as opposed to other people transportation which are in the least likely to use groups. That's things like church vans. Groups that their business is not focused on the fleet but they have some vehicles, more than ten that they use.

Most likely to use are public works, refuse and utility. Those again are the government fleets. Administration, goods transportation and agriculture.

You'll see I've underlined three different industry types, one in each column. That's because those are the biggest industries represented in our survey. Construction maintenance represented -- I'll show you that slide later. Construction maintenance fleets represented 37 percent of our respondents. So in one industry they captured 37 percent of fleets. and they are the least likely to be using as an industry alternative fuels. Whereas agriculture, which also captures a significant portion, are in the most likely to use group.

All right, so which ones are being used? CNG is the most likely to be used but most of that, or at least half of that, is in government fleets. So amongst private users it's mostly biodiesel, LPG -- here you can see that. LPG first, biodiesel and CNG and electric.

There are some industry fuel matches in

what is being used but I am going to highlight that more when we get to the non-users.

Overall satisfaction with their experience with alternative fuels is somewhere around -- between somewhat and fairly satisfied.

We asked an overall question first and you see that basic vehicle performance they're fairly satisfied with that. Not a huge amount of problems, a few typical problems that you might expect. Fueling cost, middle of the road. It's okay. It varies between which fuel is being used. Fuel infrastructure has the lowest rating as you all would expect.

And here broken down by more specific experiences the users report that environmental benefits is the number one thing they're happy with and that matched onto their original motivation to begin using. Those who are already using alternative fuels were more motivated than non-users by the environmental benefits of using alternative fuels. And that is important. It defines them as possibly a separate group.

And some of the other interesting things that came out when they were given an opportunity to talk about -- in an open-ended survey is, patriotism. That's also a reason that they chose to use alternative fuels. Reducing the reliance on foreign oil. So if anyone is interested in a marketing campaign that might be it.

Users' experiences are somewhat problematic. So they're satisfaction as you can see the bars go over a bit higher. They are more satisfied, almost fairly satisfied. The problem rating was around, somewhere between not very and fairly problematic. And the biggest problems, access to fuel stations, big surprise, then vehicle choice. And vehicle choice comes up as a much bigger problem for current users than non-users. And I'll get into that when I talk about, a little bit more about some recommendations.

Here is who is satisfied and who -- Sort of satisfaction and problem ratings by fuel type. So biodiesel and electric have like the best combination of higher satisfaction and lower problems. E85 has lower problems but lower satisfaction but that is mostly driven by the lack of access to fueling stations, lack of using fuel and lack of driving range, which is also driven by the lack of access to fuel.

Satisfaction with fuel cost varies a

little bit by fuel. There would be no surprises there, electric. And the other here is mostly gas/electric hybrid. E85 is the least satisfied with fuel cost.

Satisfaction with fuel availability varies by fuel. Again the E85 is no surprise there and electric and other are no surprise as well. Biodiesel, that was really more like two groups. There are a lot of biodiesel users who are very satisfied with their availability because they worked out very successful partnerships with a local supplier and a lot of others can't find as much as they want. So that's kind of split into two different groups.

So just to highlight that there are differences by fuel use. The problems of E85 users are relatively low unless we're talking about access. One respondent commented, "I have vehicles that will run on ethanol but I can't find the fuel."

Also the problems with biodiesel is access to fueling stations and then fuel costs. They're still not quite satisfied with fuel costs. It's about 20 cents higher. But there's also some federal tax credits that some people are taking advantage of.

I'm going to skip that in the interest of time.

So are they going to use it in the future? Thirty-eight percent are going to continue their increase and 34 percent are -- sorry, are going to continue their use and 34 percent are going to actually increase their use if they can. Twenty percent are undecided. So there's a little bit -- you know, they might. There's may be some problems there. But for those who -- it varies a little bit by fuel type. So biodiesel users the most likely to either want to continue or increase. LNG users are the most uncertain about their future use.

Changes to expand alternative fuel use amongst users. We asked them what would get you to use more, to get you to expand. And we gave them these choices. So they said, fuel use incentives, that would be great. Tax rebates, yes, very helpful. Vehicle purchasing incentives, also very helpful. What they perceived as least helpful but was still rated as fairly helpful was outreach programs. Public outreach and training programs. Because they already know, kind of basically they already know what they're doing.

I am not going to go over that right now.

So expansion among users. Whenever they got the chance in open-ended questions they talked about availability. We asked about, what would get you to increase demand, do you want tax incentives, et cetera, and they kept talking about availability over and over again. So increasing supply and availability of alternative fuels.

And then also supply and selection of alternative fuel vehicles. Alternative current users, like we saw, they're using in only a small portion of their fleets because their fleets are usually multi-use. They don't necessarily want to have to use multiple alternative fuels so they want vehicle choices within a single fuel. And if that is not available then they are not going to expand their use. So selection of vehicles and with some improvement in vehicle technology.

In particular agriculture might present a good opportunity. They are mostly interested in biodiesel, they are mostly using biodiesel. There are 20 percent already using and they're a large industry type. So they're not necessarily large fleets but they are a large industry. So if they were to be targeted amongst the users that might be a good opportunity.

Also large fleets. Because there's fleets upwards of 3,000, 5,000 vehicles but they're using alternative fuels in a very low percentage of their vehicles. They present an opportunity for quite a bit of expansion.

Okay, non-users. Sixty-five percent of fleet operators said they are interested in using alternative fuels. Thirty percent said that they were undecided. Only five percent said no, we're not interested.

They are most interested in biodiesel, second E85. I'm not sure where they are getting their information about E85 but they are very interested in it. Followed by electric and everything down from there. So even both those who said yes we want to use and those who are undecided, again most interested in biodiesel and then E85.

What would motivate them to begin using? Vehicle reliability, fuel cost savings, the things that you would expect. Lower maintenance costs, vehicle performance. Environmental benefits ranks fifth. It's still sort of on the higher end but it ranks fifth as compared to current users for whom it ranked first. So this group is motivated slightly differently.

When asked what other motivations are we missing here they said, availability. So even though we didn't consider this as a motivation that was something that they brought up again and again. Availability, then cost, then vehicle choice. They also talked about health, education and again patriotism.

One important thing. When they talked about cost they talked about alternative fuels needed to cost the same, not necessarily less than diesel or petroleum.

So their concerns about using alternative fuels are many. They are very concerned on average about all kinds of things, the highest of which is access to fueling stations. Then conversion costs, vehicle reliability and maintenance costs. Vehicle performance and choice rank a little lower.

That vehicle choice was much more of a concern for current users because they have already tried it and they know that their expansion would depend upon vehicle choice. These are people who haven't tried it yet. They don't know that their actual expansion of use would depend on vehicle choice. Fuel cost, a little bit lower than the average.

When they were given their opportunity to talk about other concerns, again, availability. Then vehicle choice and reliable information. And this is something that came up in the focus groups a lot. That there is no real, reliable information, at least as perceived by most fleet operators, on the actual bottom-dollar effects of using alternative fuels, on the maintenance problems that might arise, on whether there's manufacturer warranties that are still valid when they use them. So they just don't have the information. It's not all collected at one source that they consider to be a reliable, trusted source.

They said they don't necessarily trust their peers. They get mixed information from their peers. They don't trust information from advocates because they think it's biased. They want information they can trust. I think some of the comments say a government website would be a great place actually to have that kind of information all collated in one place.

So small fleets are going to have more of a problem starting use than large fleets. Small businesses have a harder time overcoming start-up costs and are at more risk if the availability isn't there. This is one user's comment. Basically they are afraid to start using alternative fuels.

So contrasting, the experiences of alternative fuel users in the red bars or purple bars with those who are non-users, the concerns of non-users, the concern ratings are very high, the problem ratings are relatively low. This could mean that there's actually two different groups here. That the users have different needs and/or different resources or that the information flow is really lacking here between the groups.

So when asked, what would get you to use alternative fuels, again the same pattern as the users. To expand alternative fuel use incentives, state tax rebates, vehicle purchase incentive and relaxing on regulations. Again, training and education outreach rank a little bit lower. But because we know that these fleet operators are not getting reliable information that's necessary to assure them that the performance is still going to be good. That they are not going to face any warranty changes, et cetera.

So non-users need assurance of the availability of the fuels and they need to know what the effects on the bottom dollar are. The information is either not out there or they don't trust what is out there. So they need to know what it's, what it's going to cost them, what their bottom dollar is, and they need to know that their investment is not going to be wasted.

I am going to talk a little bit about who is most willing. The biggest industries and the industry match. Industry willingness varies a bit. I'm going to just highlight a few things.

The industries that have over 70 percent of their users willing to use alternative fuels are, with the exception of wholesale, small industries representing only five percent of our sample. The large industries, agriculture, construction and maintenance and short haul goods transportation are on average 60 percent willing to use alternative fuels. A little bit lower than the average but that represents the biggest opportunities to actually begin getting industries to use alternative fuels.

As you can see this was our sample. Construction/maintenance is way out there as the most common and then followed by agriculture and short haul goods transportation.

Okay, industry-fuel match. So if we look at the big three, agriculture near the top then construction and maintenance and then short haul goods transportation. They are all interested in biodiesel primarily. So the green cells represent ones that they are more likely to be interested in and the red cells less likely. The yellow cells are on average. We couldn't tell the difference between that and the average. So biodiesel for those big three and construction and maintenance is also interested in E85.

Fleet size. Most fleets are small fleets, under 20 vehicles. In our sample 50 percent of the sample fleet size was 20 or less. Around 75 percent was 50 or less. So again, small fleets.

Small businesses have flexible decision-making structures but are at higher risk, again, when trying to new technologies so they need help with the start-up costs. Whether that's purchasing a vehicle or if there's an on-site fueling, which is probably less likely if it's a small business. Whatever they need to help them start up.

So opportunities to promote alternative fuel use among non-users. Large industries, as I talked about, are most interested in biodiesel. So if you're going to target some kind of research or marketing that might be the place to go with those three industries. And small fleets are flexible but they need help with the start-up costs. So providing some incentives for start-ups but with a clear, phase-out plan. Because a lot of users commented that when they started using alternative fuels, because of an incentive and then they had the incentive taken away at some point, that created a lot of mistrust.

I have what, a minute? Okay. Top four recommendations, here we go. One, disseminate all current information on alternative fuel use in an easily accessible format from a trusted source. So a website format. A little outreach wouldn't hurt either to make sure that people know that that information is there and make sure that it's reliable and it's consistent. That they are not going to hear mixed reports on it.

Okay, generate accurate -- I am also a researcher and I always have to include additional research. Generate accurate information on the costs and benefits of alternative fuel use. So I would recommend actually sponsoring an experimental study to look at the basic stuff that they can't find information on. What is the performance actually like compared to petroleum in these vehicles and what bottom dollar impact does it have.

Address the supply of alternative fuels in vehicles by facilitating conversations between fleet operators and suppliers and manufacturers.

And help small businesses afford the start-up costs but include a clear plan for the phase-out of incentives.

MR. OLSON: Thank you, Claire. Any comments or questions? Okay. So thank you, Claire for doing that. A very good presentation.

Our last presentation will be Robert Stumberg. He is with the Harrison Institute with the Georgetown University Law Center. And we have asked him to make a comment on a couple of -- We had lots of recommendations here ranging from incentives to regulatory, R&D investments and education types of programs.

At his university he does work on assessing what types of WTO challenges might occur. Particularly for any new initiative that we might be considering here. He is going to give a short presentation on some of those potential obstacles.

MR. STUMBERG: I guess I should say good evening now. I think I am here to help you imagine ways to safeguard the policies you decide to adopt. Not in the next stage of decision-making, because the next stage will be focusing on how the California market works and which policies work best for California. But as you implement them the theme we want to get across today is defensive driving.

As you are driving your policy into the future, focusing on the road signs about California economics and sustainable fuel markets, how can you avoid being swiped from the side from people or economic interests or countries you really hadn't been thinking about because they are outside of California.

The reason we are here -- I'm going to skip my introduction because it is no longer really necessary. The reason we're here is because my program at Georgetown Law School works with cities and states in their efforts to oversee development of international trade policy really from the bottom up.

We work with five states that have oversight committees to deal with international trade policy in the state capitals. We have a series of multistate working groups in areas like health services generally, energy, rural development and investment. We coordinate all these activities with national associations of attorneys general, the state legislatures, and we have had the privilege of working with California agencies on studies dealing with coastal zone regulation, desalination projects, liquified natural gas terminals, and the way that international rules relate to electricity.

Basically what I'd like to do is give you my introduction and my conclusion today. So here it is. You're driving your California transportation fuels policy into the future and you don't want to be sideswiped. You want to stay in the lane that you've chosen to be in. That's why you have rear view mirrors, right? My metaphor today is going to be three rear view mirrors.

Who are the folks that might try to sideswipe you in the future based on their ability to use trade rules? Either legally, which means another country has to get involved in the action and bring a complaint against the United States, not California directly. Or more likely, politically. Somebody who has got the political clout to lobby inside California for or against the way that they want the policies to be implemented.

Lobbying comes from, so I am told, not only companies involved in this sector but foreign governments. Which has happened in this town. For example, construction standards have been lobbied against by Japan within minutes of the bill going from the Legislature to the Governor. Or lobbying by federal officials who now have a stake in how states adopt policy that might affect international trade commitments.

So I think there are basically three angles you could expect potential sideswiping behavior from. One of which would be countries that export petroleum products into California. Your biggest sources of petroleum imports are Saudi Arabia and Ecuador.

A second source would be countries that have the capacity in the future to export ethanol into California. Right now we're talking about Brazil but there are lots of interesting new market entrants. We're talking about markets that really don't even exist yet so it's hard to predict who they might be.

You need to have a third rear view mirror because there's another class of people that might be involved, and these are the service suppliers for the industry for either ethanol or petroleum. Service suppliers are not the countries per se but the multinational companies that are based in those other countries.

Give you an example. The biggest supplier I'm pretty sure in petroleum is Halliburton, which as of next year will not be a United States company, it will be a Dubai-based company. In the ethanol sector probably ADM is going to be the market leader. They have heavy investments in Brazil and lots of other places.

So you want a third mirror to make sure you're not surprised by something that might be able to sideswipe you.

So your mission, to try to adopt a whole variety of policies that will build a sustainable fuel economy. Ideally California will be a national model. Perhaps an international model quickly as Canadian provinces pick up the pace and adopt your standards.

Trade policy is designed to regulate governments, not just trade. There are a variety of trade policies, by our count roughly 15, that go beyond regulating trade to regulating domestic regulation, domestic taxes and domestic subsidies. And the way they are set up, they scrutinize those measures that are most likely to shift markets. In other words, policies that don't work don't matter to international trade. Policies that do work, that actually do shift markets are the ones that get scrutiny.

So almost by definition if you're putting together a strategy, a combination of regulation, subsidies, for example R&D and taxes that work, you're putting yourself within the zone of trade policy. You will be covered by trade rules. And then the next question is, whether you are in conflict with those rules.

So the point about driving defensively is to be able to anticipate how you might be sideswiped, including by whom, using which trade rules.

Now having said that let me just give you an example of three kinds of trade rules. I'm going to have to skip using slides here.

The first kind, just to present the contrast, is the kind of trade rule you're all familiar with, tariffs. This is where a trade policy actually does regulate trade and there is a big tariff issue out there, the 54 cent per gallon plus another two percent tariff on ethanol imports. Whether you're supporting it or opposing it it's obviously a factor in the kind of decision you make. Because if that tariff is not in place you might make different decisions. Or if it is at risk of being repealed or sunsetted in a few years you might make different decisions.

The second kind of trade policy I want to mention is also one that you might predict. There are multiple trade agreements which have rules against discrimination against foreign suppliers of either petroleum or ethanol. The point I want to make about these rules is that very rarely do the kind of laws that are attacked in the WTO, the World Trade Organization, amount to laws that explicitly discriminate. People are arguing about discrimination in effect. What lawyers might call, de facto discrimination.

So the question is whether or not you're putting together policies which will have the effect of changing the conditions of competition so as to disfavor some foreign suppliers or favor some domestic suppliers.

In the past there has been trade litigation over a market shift, a shift of market share of as little as one percent because the trade volumes are so large.

Let's skip this fellow and go to one more example. There's a third class of trade rules that are designed to affect policies that are by definition not discriminatory at all. These are policies on domestic regulation or taxation which are simply governed by trade rules because the purpose of the rule is to limit governing authority.

I'll just give you one example out of

dozens. This is a requirement from agreements on both services and goods that says that policy makers must use international standards when setting their own standards or technical regulations. I picked this example because it relates very closely to the low-carbon fuel standard that you heard about earlier.

So keeping in mind that last point that there's a whole class of trade rules that are designed specifically to cover law-making when the laws are not discriminatory, including standard-setting, the very kind you're considering. Let me skip all the way ahead to my conclusion.

Okay. So the theme is defensive driving and the purpose is to anticipate who might swipe you this year or next year, ten years down the road. And whether or not you feel you can stay the course or whether you feel knowing the kind of arguments they might bring you should change lanes. The whole idea of this is not to be forced to change lanes in a way that surprises you but rather to have enough foresight, or in this case hindsight, looking in your rear view mirror that you can figure out what's going to come.

There are two ways you can use this

knowledge and the first is the way you draft your measures. Now let me be clear. I am not suggesting for a minute that any of the basic options I read that you're considering are not doable under trade policy. I think they are all doable. You can do pretty much everything you want to do, but depending on how it's drafted, you may do them in a way that has a high risk of being sideswiped in the future by a trade complaint, or it may have a low risk.

You can choose the degree of risk you want to undertake based upon whether you think that policy needs to be experimented with. In other words, the amount of risk involved, just like in driving up the highway, the risk is under your control. I am not going to get into the details of the kind of roadmap for drafting we might suggest except just to make the point that the risk is under your control and there are a lot of different ways you can control it.

And the third way you can use, or the second basic way you can use the anticipation of potential trade conflict is to collaborate with other states to essentially influence future events outside of California.

So for example, if you decide that the federal tariffs on importing ethanol are an important foundation for your policy, as I believe your Governor has recently reiterated, then you will be in a better political position to work with other states, but perhaps also a better policy position by making sure that states are working together effectively to use that foundation for policy making in the most efficient way possible. Not simply to waste it or use it for protectionist purposes.

The second example is that there are service disciplines now being negotiated. Excuse me for lapsing into jargon. There are trade rule that are currently being negotiated in the service sector and they cover domestic regulation of such categories as wholesale or retail trade in fuels. That is an existing trade commitment of the United States.

The United States is offering to make new trade commitments on bulk storage of fuels and pipeline transportation of fuels. Based on the conversation earlier about infrastructure you can understand that the kind of policies you might adopt could have a huge impact on that sector. So that if a multinational company based in another country feels like the policies you're making are not convenient or going to cut into its profit line they can use the trade rules to try to sideswipe you and encourage you to move into a different land and take a different approach.

Thirdly, there are -- that would be three. Fourthly and finally (laughter) let me just refer to standard-setting one more time. Standard-setting is a vague term but you've got a really clear example with the low-carbon fuel standard of what a standard looks like. It is really a complicated thing but it is very powerful.

It is a way of measuring, it is a way of channeling economic behavior, and it is something you can use for any variety of laws, not just cap and trade systems but regulatory standards, standards of taxation, thresholds for subsidies. You can use it all kinds of different ways. A standard is a very useful tool.

We've looked around to find if there are any standards on ethanol yet and we have not been able to find it. That doesn't mean they don't exist. If any of you know of such standards please let me know. We know the United States has begun negotiations with Brazil on ethanol standards. And we know that the largest standard-setting organization in the world, the ISO, the International Standards Organization, is about to begin the process to set standards on ethanol.

It is an interesting organism this ISO because they set international standards in an area that is going to cover much of the turf of the policies you are about to adopt but you may actually beat them to it.

The ISO is an organization that's really a family of technical committees. As you might imagine it is populated by lots of folks from industry who have very technical expertise. The global committee that will work on the standard is chaired by the expert from the American Petroleum Institute. And the law firm that represents more companies than any other on these ISO committees, including this one, happens to be the law firm that also represents Brazil.

Now you might be thinking I am winding up to give you a pitch that the ISO is rife with conflicts of interest, but I am not. Considering the nature of standard-setting it is most appropriate that these kind of folks be on these committees. What I want to say is that the participation is not representative of policy makers, particularly at the state level, particularly California which is driving this policy.

Thanks for letting me share with you these thoughts. My point is that you can avoid being sideswiped by trade collisions in the future by anticipating the conflicts and the arguments and by imagining the kind of role you would play in international standard-setting or other approaches to collaborating with your sister states.

PRESIDING COMMISSIONER BOYD: Thank you for your presentation. You have brought up some fascinating points. While I am infamous for referring to us as the nation-state of California I had never quite looked at it in the same perspective you just laid out for us.

The point about collaboration, I think as a nation-state we're pretty good at collaborating with other states and trying to build up momentum to change the views of our central government. And then we have a very strong weapon, we call him the Governator, that's pretty effective in this arena.

Your analogies to Halliburton and ADM are interesting. Halliburton I had never thought of before. But maybe they've got such a black eye over the Dubai exodus that we don't have to worry about them. ADM on the other hand, I have personal mental scars from ten years ago probably dealing with the subject of ethanol in California. So when you couple ADM with the federal government and trade and tariff policy in Washington it gets a little scary.

I almost hate to say this but my personal biggest fear is probably our own federal government. But nonetheless you point out some interesting things and you do remind me to have us kind of go to the dark side for awhile and look in your, I like your three rear view mirror analogy, and take a look at what might be coming and try to plan for that.

With regard to Brazil. I've noticed them trying to create a world market for several years and not directly the US over its tariff, even though that gives them great pain. I found it interesting the President visited down there and talked about collaboration and maybe building an ethanol industry in all of Latin America but he still hung tough on the tariff so I don't think that's going away any too soon, particularly with people like ADM and the others in the wings. But nonetheless it does bring up an interesting point.

At the beginning of the day I talked about everything is part of a giant system. This is one where I feel if we do poke it the wrong way somewhere there will probably be a consequence somewhere. So I found that most interesting. Frankly like I found the previous presentation about customer attitudes also helpful for us.

MR. OLSON: Okay. Any other comments?

I do have a blue card from Bob Giebler, Giebler, AAA.

Okay, any other comments from the audience here about the overall workshop? Mr. Sparano.

PRESIDING COMMISSIONER BOYD: How did you not notice?

MR. SPARANO: Excuse me, I'll be more formal. Commissioners, Ms. Brown, a pleasure to be here again. This is my fifty-first time at this or other podiums. But after nine hours you've got to give me five minutes. I promise to keep it tight.

But for the record my name is Joe Sparano, I'm president of the Western States Petroleum Association. We are a nonprofit trade association that represents 26 companies that explore for, produce, refine, transport and market petroleum, natural gas and petroleum products in California and five other western states.

We thank you for hosting this day, it has been very informative. It is good to stand before you again and talk about a subject that is near to all our hearts and that is the future of California's transportation fuel supply and that supply portfolio.

We believe AB 1007 is really important. It is important that the CEC and CARB are having a joint workshop where energy supply and air quality needs meet. We believe a strong partnership between these two critical elements is essential to successfully diversify California's transportation fuels portfolio in a way that doesn't have a negative impact on either air quality or the state's economy. That's I think a critical point. Both those needs have to be served as this process moves forward.

AB 1007 is directly linked to the low-carbon fuel standard which names it even more important. There is a lot at stake and we have to get this right. If we don't the lifestyles our families enjoy, the health of our businesses and the vitality of our economy all might be harmed. We can't afford to get our energy supply future wrong. We don't want to end up with unintended consequences that prevent us from supplying adequate, reliable and affordable fuels to California consumers.

As you know WSPA has constructively engaged in the implementation process at all levels and has committed several comment letters to the administration. We have also provided input to the CEC, to CARB on all parts of IEPR and AB 32 as well as to the UC professors, Professor Sperling and Farrell and their group as well as recently to the Market Advisory Committee. And we want to emphasize the role markets can play providing businesses with flexibility that will be needed to meet these goals.

There are many uncertainties and unanswered questions in this complicated process.

What's important to us is that the assumptions used are reasonable and that the process design going forward improves upon the knowledge base and the tools that are needed to choose the best fuel pathways to meet the goals. We believe these pathways must be scientifically sound, technologically feasible and cost-effective.

We can't simply presume that these criteria can be met. I think it's a really important point. As we go forward we have to know that. Presumption doesn't cut it here. The process must be structured to allow the science and the best knowledge that we have to prove those goals attainable.

WSPA understands that there are regulatory timelines that must be met and we are not trying in any way, shape or form to delay meeting those timelines. To enhance the likelihood of success we suggest the following approach as a way to assist in answering the unanswered questions: Improve upon the tools to accomplish the goals and ensure a process to check progress against plan.

The first element is to establish a public/private collaborative to assemble a broad-based, representative and technically competent team of individuals to provide input into the low-carbon fuel standard process. This would not be in lieu of but in parallel with the CARB rulemaking that is going on.

This is essential to continue developing what we believe are two technical and economic elements to achieve success. One is further review and improvements to the full cycle, the full-fuel cycle analysis and GREET model for development of a better model to do the necessary well-to-wheels analysis. The other is to develop a California-specific dynamic simulation transport energy model to evaluate and compare various low-carbon fuel standard scenarios, including their economic impact.

WSPA is glad to see the Energy Commission actively pursuing these items and CARB and the UC review considering and suggesting them as well. And we are very interested in continuing the dialogue in this area.

The second element is to schedule biennial milestones over the implementation period of the low-carbon fuel standard. I went through this before so I won't belabor it but we think there is great merit in checking where we are and ensuring that we are not creating a problem with the existing or growing, new fuel supply system.

And I think the interesting presentation we just saw, we're talking about defensive driving. It's just another piece of defensive driving. Another rear view mirror just to make sure that things aren't coming at us that we haven't anticipated. And that when we discover them we don't want it to be too late to change course.

This progress review against plan will allow policy makers to be alerted to the potential for disruptions in transportation fuel supplies and the associated market volatility. We would also like to meet and discuss how one would structure such milestones. We are willing and interested in working with you on this.

The third element involves an investment in technological innovation and distribution infrastructure. For both petroleum-based fuels and renewables we believe that marine infrastructure and the ports and the policies of the ports represent a significant hurdle to success. And the Westway terminal situation that was described earlier, other businesses in the Port of Los Angeles in particular are being impacted negatively in terms of their business viability and longevity.

And I think while that may initially impact exiting fuels there is a great probability that that kind of policy if unchecked and unattended to on a state level could really have an impact on the success of the low-carbon fuel standard.

The final element is cost-effectiveness. We believe it is critically important for all of us to agree on the basis for cost-effectiveness assumptions and calculations. So our over-arching message to you is, don't pick winners or losers. We need to rely on a performance-based approach, which I think we have been talking about in great detail today, and allow technologies to compete. We need to build in incentives for innovation and encourage market-based approaches that minimize cost.

WSPA and our members are prepared to work closely with CEC and CARB to build a durable, science-based framework and a collaborative process to sustain the long-term growth and effectiveness of these initiatives.

I think we are going to have to allow for institutional learning and create an evolving and open process that promotes new ideas and enables changes in direction to occur. We must keep improving -- The impact of these initiatives that we're talking about will be with us and our children and our grandchildren for a very long time so we'd better get it right.

Thank you for giving me a chance to share our input with you. Any questions?

PRESIDING COMMISSIONER BOYD: Only a comment. Thank you, Joe. I can't speak for the ARB and the low-carbon fuel standard process and your progress against plan checking so I won't try to speak for them.

I just would note to all stakeholders, not just to you folks, but your comments reminded me of that. That to all stakeholders in all fuel areas, in fact in all energy areas in California the Integrated Energy Policy Report process, which is a biennial process with an annual trailer quite frankly, does afford and offer people an opportunity to air their concerns on any one of a number of energy issues and is kind of a progress against plan process.

So I just offer that up as one form at least that is available to folks to bring to at least our attention issues that have popped up in energy arenas since, let's just say since we've had our last get-together on the subject. So there are some opportunities and I'm sure the ARB is a fairly open forum as well available to you but I'll let them speak for themselves over the next 18 months. Mike Scheible is smiling down there over the process he has to deal with before he can retire. Thanks, Joe.

MR. OLSON: We have a person on the line?

Any other comments? Yes, Jamie.

MS. KNAPP: I guess I do get to say good evening. Commissioner Boyd, Chairwoman Pfannenstiel, I'm Jamie Knapp. I am an independent consultant representing a number of environmental organizations that traditionally are tracking alternative fuels and transportation issues here in California.

I know my head is spinning and I'm sure yours are, your heads are probably spinning too. It has been a tremendous amount of information today, a lot of ideas and possibilities to consider. We have been meeting with staff on and off over the last year on the 1007 process.

And it is very clear to me from some of the comments we've heard today that there's probably going to be different levels of consensus on some of the recommendations that we expect to hear from staff. We've seen some of the recommendations and the scenarios, we have seen these draft reports.

And I guess I'd like to suggest a process or ask for a process consideration here. And that is, as staff moves forward to integrate these different scenarios into the report, and I gather we're going to see the full report in the next week or so and then we have what, less than two weeks to provide detailed comments before it goes to your board and then on to Mike's board next month.

That maybe that there is a, there is way to include only those recommendations about which there's clear consensus or that because of uncertainty perhaps consider that some of the recommendations be held off that provide some more time for staff to keep going with this process.

Because it has been a very detailed and thorough process.

I know you have a legislative mandate and I know we're all thinking, oh my gosh, we have to get through this. But that would provide more time for stakeholder input, stakeholder revisions. And maybe there is a way to issue an interim report or a draft report to meet your legislative deadline. I believe there is a precedent. It was the CO2 sequestration report, AB 1925. So it's just a -- it's a thought, it's a consideration. Thank you.

CHAIRPERSON PFANNENSTIEL: Thank you.

PRESIDING COMMISSIONER BOYD: Thank you. And I want to clarify I think one misunderstanding I thought I heard with regard to the report. The June 8 submittal date deadline for written comments is with respect to what was provided for or presented today, not on any soon-to-be released report.

So after June 8 is when this organization will generate its alternative fuels plan, which will or will not incorporate some facets of the low-carbon fuel standard. Which plan will then be submitted to the Governor and the Legislature as well as passed over to the ARB for their consideration, I think is the words in the law, but the low-carbon fuel standard Executive Order adds a new element of concern.

I understand, I sympathize with you and everyone else and with us. I sympathize with our staff over -- The low-carbon fuel standard has, you know, put a new layer of issues, interests and concern over this issue.

But by the same token since it is a process that has at least 18 months to go it affords another opportunity to continue the discussion, debate and what have you. And will frankly have a very significant, play a very significant role I think in directing which way the silver buckshot, not the silver bullet might get directed as we work our way through a plan.

And concurrently I see as traveling a three rail track here and maybe the third rail is the dangerous one. But nonetheless we've got the bioenergy, biofuels effort underway. We've got the alternative fuels effort underway. We have the low-carbon fuel standard effort underway. They all tie to each other and they will all affect each other. And I'm not quite sure what comes out of the process.

I think we are determined to make sure we meet our legislative commitment. But I think the world's view of what we produce coupled with the continuing debate over the low-carbon fuel standard may change some people's view of where this is all going. I don't have the answer, that's the best I can do at the moment. So we'll take under consideration your thoughts and comments. As the staff works to deal with this, why, we'll see where we stand.

CHAIRPERSON PFANNENSTIEL: Are there other comments?

MR. GAUTAM: Commissioner Byron.

PRESIDING COMMISSIONER BOYD: Commissioner Byron is on the phone.

CHAIRPERSON PFANNENSTIEL: Go ahead, Jeff.

COMMISSIONER BYRON: Thank you. I'm sorry if my timing is inappropriate but I want to be sure I had a chance to just remark on the work that the staff in pulling together this workshop and to thank them very much.

But I also wanted to thank all the excellent participation we had. The members of the public were very cooperative and helpful in all their comments. So my timing may be off a little bit on this but it just takes a little while to work through the queue and I didn't want you to, I didn't want you to end the meeting and hang up on me (laughter).

PRESIDING COMMISSIONER BOYD: We would never do that to you.

CHAIRPERSON PFANNENSTIEL: Thank you.

COMMISSIONER BYRON: Thank you, Commissioner. Thank you.

CHAIRPERSON PFANNENSTIEL: Other comments? Go ahead, Jim.

PRESIDING COMMISSIONER BOYD: I have a note here from Dr. Sawyer who did apologize for having to leave early. He's torn in many, many directions these days. And he just wanted it to be passed on to all the staffs and all the stakeholders his appreciation of the effort that has been undertaken and that he looks forward to working with us and with everyone else in the future on this subject and on the subject that will go before the Air Resources Board in the near future. So I appreciate the fact that he left that message for us.

CHAIRPERSON PFANNENSTIEL: Thank you. I just have a procedural comment. I realized in the course of today that this workshop, which was noticed as a joint workshop between the Air Resources Board and the Energy Commission was not in fact noticed as a workshop in the Integrated Energy Policy Report proceeding.

And therefore I wanted to make sure that all of the very valuable information from today did find its way into that docket, which is a separate proceeding and somehow was not picked up in this.

So this information from the entire transcript of today and all of the very valuable information that people presented here, the staff and the other presenters, I want there to be an assurance that that will in fact find its way into the Integrated Energy Policy Report docket and be used by us in making recommendations to the Governor on this subject.

With that, Tim, anything further?

MR. OLSON: We will do that.

CHAIRPERSON PFANNENSTIEL: Anything else for this afternoon?

MR. OLSON: Not from me and I don't know

if there are any other comments.

CHAIRPERSON PFANNENSTIEL: Well.

MR. OLSON: No more panels, no.

CHAIRPERSON PFANNENSTIEL: Not waiting for any more, then Jim.

MR. OLSON: I think we've lost all of our phone people right now.

CHAIRPERSON PFANNENSTIEL: Okay.

PRESIDING COMMISSIONER BOYD: Just my thanks to everybody. Particularly all of you still here to tough it out. I guess it was either one nine-hour workshop or a series of individual workshops. And maybe it's easier to take all this in one nine-hour splurge, even though it's like drinking from the fire hose as the old analogy goes. But thanks to everybody. This has been a really interesting day if not a trying day.

CHAIRPERSON PFANNENSTIEL: Thank you. We'll be adjourned.

(Whereupon, at 6:16 p.m., the Committee Workshop was adjourned.)

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CERTIFICATE OF REPORTER

I, RICHARD FRIANT, an Electronic Reporter, do hereby certify that I am a disinterested person herein; that I recorded the foregoing California Energy Committee Workshop; that it was thereafter transcribed into typewriting.

I further certify that I am not of counsel or attorney for any of the parties to said workshop, nor in any way interested in outcome of said workshop.

IN WITNESS WHEREOF, I have hereunto set my hand this 8th day of July, 2007.