BEFORE THE

CALIFORNIA ENERGY COMMISSION

In the Matter of:) Docket No. 09-ALT-1

AB 118 2010-2011 Investment Plan)

Staff Workshop for the 2010-2011 Investment Plan (Biofuels Waste-Stream, Purpose Grown, and Bioengineered Feedstocks, and Production Technology and Economics)

CALIFORNIA ENERGY COMMISSION
HEARING ROOM A
1516 NINTH STREET
SACRAMENTO, CALIFORNIA

TUESDAY, SEPTEMBER 15, 2009

(Biomethane, Algae, and Biofuels Feedstocks)

Reported by:
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Staff Present:

Leslie Baroody
Peter Ward
Jim McKinney
Ysbrand Van der Werf
Pilar Magana
Bill Kinney
Dave Effross
Mike McCormack

Also Present

Presenters

John Boesel, CalStart
Paul Relis, CR&R
Mike Beckman, Linde

Panelists

Dr. Stephen Mayfield, UC San Diego, San Diego Center for Algae Biotechnology
Matt Peak, Prize Capital
Matt Frome, Solazyme
Kay Martin, Bioenergy Producers Association
Ted Kniesche, Fulcrum Bioenergy
Steve Kaffka, UC Davis
Rosidah Radzian, American Palm Oil Council
Dave Rubenstein, California Ethanol and Power
Phil Treanor, TSL Seeds
Clark Ornbaun, Ornbaun Farms, Inc.
Carson Kalin, Kalin Farms/Imperial Valley Bioresources, Inc.
Thor Bailey, Sustainable Farm Systems, LLC

Public

Kenneth Brennan, PG&E
Warren Smith, Clean World Partners
Joseph Choperena, Sustainable Conservation
Mike Eaves, Clean Energy
Tom Fulks, Neste Oil

I N D E X

P R O C E E D I N G S

SEPTEMBER 15, 2009 9:20 a.m.

MS. BAROODY: I just want to welcome you all to the California Energy Commission's second day of the Biofuels Workshop. This is also the second in a series of workshops for the 2010-2011 Alternative and Renewable Fuel and Vehicle Technology Investment Plan. We really appreciate you taking the time to be here with us today and we welcome those of you listening online. Yesterday was a very productive day for us. We heard some excellent presentations and had some very good questions and discussions, and I expect that today will be quite useful, as well.

I would like to introduce our team from the Emerging Fuels and Technology Office of the Fuels and Transportation Division. I am Leslie Baroody and I am the Project Manager for the 2010-2011 Investment Plan. Jim McKinney is Supervisor for the Policy Unit and Coordinator for this Biofuels Workshop. He was assisted by Rhetta deMesa, Mike McCormack, Bill Kinney, and Ysbrand Van der Werf, and they have all put this workshop together. Peter Ward and Tim Olson, who will be here shortly, I believe, they authored last year's Investment Plan and are experts on alternative transportation fuels and technologies. Jim will be moderating our panel today and our discussions and Pilar Magana will continue helping us with the WebEx system. All transcripts and audio will be posted to our website hopefully within the next week.

The main purpose of today's workshop is for the Energy Commission staff to acquire information needed to provide the basis for allocating $100 million in AB 118 funds. We need updated information on biofuels, waste stream, purpose ground, and bio-engineered feedstocks, as well as production technology and economics. Today's workshop will focus on biomethane, algae, and biofuels feedstocks. This workshop is really just the beginning of the data collection process. We will continue the process with a review of the docketed materials, subsequent dialogue, and additional input.

We have a full agenda and we want to have time for public comment at the end of the day, and for those in the audience and on WebEx. John Boesel of CalStar will begin with a presentation on Biomethane, followed by the morning panel on algae biofuel production, then waste derived and purpose-grown feedstocks will be at 10:40, probably more like 11:00 now since we are behind about 20 minutes. We will try to adjourn for lunch from noon to 1:00, and this afternoon we will have another biofuels feedstock panel with a break at 2:20, as well as a biomethane transportation panel at 2:30, and then from 3:00 to 4:00, we will have a public comment period.

As I mentioned before, this is the second in a series of workshops in September. This Friday, we will be in Long Beach for a natural gas propane vehicles workshop at City Hall. And then we are planning to have an electric drive infrastructure workshop in San Francisco, probably in early October, and then September 29th, we will be meeting here again for a hydrogen workshop.

Well, the next step in this whole Investment Plan process is for staff to analyze and incorporate all the information gathered at these workshops. We plan to produce the draft of this Investment Plan for our first Advisory Committee meeting in November of 2009; we will then have two more public workshops for the Draft Investment Plan, followed by another Advisory Committee Meeting in December. And we hope to have a final draft by January of 2010. Well, if you are not already on our list serve, I encourage you to sign up on our web page. It is on the bottom right hand corner of the AB 118 Investment Plan tab. So, thank you so much for your attention and I will now hand over the mic to Jim.

MR. McKINNEY: Good morning, everybody. Again, Jim McKinney, Energy Commission staff. And I can echo a little bit about what Leslie said yesterday, it was just an excellent excellent set of presentations, and I say in all sincerity, this is really the fun part of the job for me, is hearing the creativity and innovation of the private sector in California. I learn so much when we have these workshops in our kind of closed-door developer meetings. So we very much appreciate everybody who came and shared information and perspectives yesterday, and I really look forward to today's set of panels. I think it is very interesting and we are hitting some hot topics today. I would like to kind of gently remind folks time limits are 15 minutes, we may have a little bit more flux today, but I will try to keep this to schedule. And I would also like to ask the panelists to be mindful of the questions that we provided. This set of questions we are interested here today really have to do with market mechanisms, market systems. We have a modest amount of money through AB 118 to kind of strategically inject at different points in the pathways and production processes, and getting technologies and products to commercialization. It may seem like a lot of money in the aggregate, but when you break it down among the fuel pathways and individual projects, again, it is modest. But I think there is a set of questions, as well, and people did a really nice job of answering those yesterday, which is, you know, exactly how much money, what type of money, whether it is direct grants, or loans, or loan guarantees, are most appropriate to your fuel pathway sector and your specific project. With that, oh, I also want to acknowledge Chuck White because we had to split the biomethane panel to accommodate the CalStart team, so Chuck is going to be at the end today. Does that still work for your timeline, Chuck?

MR. WHITE: I have got my very own panel to myself.

MR. McKINNEY: Great, excellent, okay.

MR. WHITE: Although at the end of the day….

MR. McKINNEY: So waste management is doing some pretty innovative work in the biomethane sector, so I would ask all of you to state through to the end of the panels so we can hear what he has to say. But with that, let me introduce Mr. John Boesel. Are you the President of CalStart? Is that correct? Yeah. And then his team will include Paul Relis and Mike Beckman. And if I could ask you gentlemen to come up here to the front microphones, and then the same with the algae panel, if you can come up to the front desk, so we have allocated 30 minutes for this. And, John, take it away.

MR. BOESEL: Okay, Jim, thank you very much. And, Leslie, I appreciate your help and support today and the opportunity to present to the Energy Commission on the lowest carbon fuel, according to the California Air

Resources Board, and our ideas about what is needed to move this forward. And if I could figure out how to move the slide forward. I need it to be in a better position.

Okay, so first of all, just a primer on natural gas versus biomethane is that natural gas is the cleanest burning fossil fuel, and a very good fuel; biomethane, or biogas, is renewable fuel. Natural gas tends to have fewer greenhouse gas emissions than natural gas, and in biomethane, when you include the emissions that would normally release in the atmosphere; it is very low by CARB standards. Some analysis in Sweden suggests you could even have a negative number. And both are very good from the tailpipe in helping to improve air quality. And there is a lot of feedstock in both two of our heavily polluted areas in the state, San Joaquin Valley and the South Coast Air Quality Management District.

I think what we have really learned from folks abroad, in Sweden in particular, is we have talked about the RPS and Renewable Portfolio Standard in greening the electricity system, what we really have now is a chance to green the gas pipeline. A very exciting opportunity. Sweden is really -- I really commend the Swedes for what they have done in really launching the biomethane industry in their country. Here are some of the vehicles that are operating every day, consistently, reliably, affordably, in

Sweden. Here is a picture of some of the production facilities in Linkoping, which I like to call it the Bakersfield of Sweden in that Bakersfield is where we have all of our big oil production, and Linkoping is where the major biomethane is being produced in Sweden. All of the technology is off-the-shelf; there is nothing exotic about it. This is zero technical risk when it comes to implementing and making use of this technology. In Sweden, this industry has really been growing fast. About a 37 percent annual growth rate in the number of methane gas vehicles in Sweden. When you look at the number of stations, about a 25 percent annual growth rate in the number of stations. And then the total number of actual gas sold is also growing at about a 21 percent annual growth rate. And what they are doing is mixing both natural gas, fossil gas as they sometimes call it in Sweden, and renewable biomethane. And about 55 percent of all the methane sold is in renewable form.

So here is just a summary of the CARB numbers for the different types of biomethane and, as you can see here, biomethane is by an order of magnitude the lowest carbon fuel in California. Most people, it is hard for them to understand that this fuel and then vehicles running on this fuel is actually cleaner, lower carbon than electric vehicle, and the best case scenario, it produces only about a third of the emissions of an electric vehicle on the California grid.

Through some advances in technology, the Swedes have produced some studies that said, by 2030, perhaps, biomethane could be producing and meeting 25-30 percent of the transportation demand in Europe. In 2006, we led a delegation over to Sweden and then actually had a formal MOU signed between the Kingdom of Sweden and the State of California to collaborate on the development of bioenergy and biomethane, in particular. Great document, good ceremony, and what we are here about now is how do we really put money behind that and really make things happen in California.

Here are some numbers that talk about the cost of biomethane production in Sweden, and the middle column there is basically the cost of producing electricity, and then the right hand column is producing, using biomethane as a petroleum replacement. And this works in Sweden, the economics work in Sweden. Now, they have got a different tax structure for fuels than we do here. And I would say one of the key things we really need to do is learn about the economics of biomethane in California, and that is what we are really asking the Energy Commission to do, is what we really need to do is get some plants on the ground, get them operational here in California, and what we like to do is recommend at least a $25 million investment by the Energy Commission in biomethane to build production plants that are running on a variety of feedstocks using different technologies so that people can then go to those facilities, kick the tires, and see that it is really possible. And we have seen this happen with so many other fuels. SunLine Transit down in the Coachella Valley, and AC Transit in the Bay Area, they are great learning centers for people to learn about hydrogen in the transit industry, and by going there, it is encourages them to experiment and develop programs of their own. So I think that is really what is needed, is a more significant investment. This year's Investment Plan only called for a $10 million investment, but I think when you talk about really getting this industry off the ground and running, that we need a bigger investment.

We are very encouraged by the work done by some of our partners. Microgy already has three biogas projects permitted in the San Joaquin Valley, and this would be to effectively take developed biomethane from Ag waste and use it as a pipeline gas. What we would like to do is get some additional money to help Microgy to take some of that gas and actually use it as a transportation fuel so that we can demonstrate that biomethane is viable and can be converted from Ag waste. And we have gentlemen -- Paul Relis is here today and he will talk more about the CR&R project, a very innovative system, to demonstrate ways to take compostable waste, or biowaste out of the regular solid waste stream, out of your gray barrel, if you will, and then turn that into a fuel so we get less waste going into the landfill and we get turning waste into a fuel. And one of the things I really want to emphasize with biomethane is there is no food versus fuel conflict. This is taking all waste material, so a very important opportunity. And then Mike Beckman will talk a bit about their technology and what they are doing with waste management to further develop landfill gas and power trucks on it and Chuck will talk about that during his panel. And, again, I think what we really want to do is be able to demonstrate the use of this fuel and have it take these different waste streams and understand the economics associated with them.

And something -- I do not have in my slide presentation here, but I think it is an issue that we will want to work with the Energy Commission on, and maybe we could do it through this program, is to really figure out the process, much like they have done with the RPS, is to figure out, if you put biomethane into the pipeline system, how can then somebody get credit and take out those green molecules and put it into their vehicle. That is a protocol that I think we need to establish. It is one of the ways in which we are different than Sweden, and it is an advantage to us. The Swedes actually do not have a very developed natural gas pipeline network in their country. They do not have natural gas reserves. So they are actually just developing their nature gas pipeline system. We already have that, so how can we use that to help make the economics even more attractive here in California?

And so I think I have probably hit on both -- most of the key points here. And I just want to summarize before I turn it over to my fellow team members, is that the lowest carbon fuel, according to CARB, is sitting there. We really -- we have two trucks right now, right down there, Rob Hilarides' trucks down in Tulare -- he is operating those, he put it altogether by himself, a pretty low budget operation, very entrepreneurial, we would like to get him more trucks. But this is all we have right now in California. So here we know we have got the lowest carbon fuel, virtually no technical risk. How do we jump start it? And how do we really get it going? And, really, what we have learned from the Swedes, we have gone over there a couple of times, is that they started with just small projects, just like we are talking about, people can come and learn from them, and build off that experience. And, again, the economics and, lastly, our hope is that we really, for the United States, we become the Sweden, where we become that role model state where other people are coming in California, much like other Europeans and even people from Asia are going to Europe and to Sweden, in particular, to learn about biomethane, that we become that place where it really took off first. So with that, I would like to turn it over, I guess first to Paul Relis of CR&R, to talk about his specific project.

MR. McKINNEY: So, John, if you could come up front and if I could just make a gentle correction on one of your statements, they are actually not ARB numbers, they are actually joint Energy Commission and ARB numbers funded by the grace of a major contract that we fund through Lifecycle Associates, so….

MR. BOESEL: Thank you.

MR. RELIS: Good morning, everyone. My name is Paul Relis. I am Senior Vice President of CR&R, and my presentation will cover our journey, so to speak, trying to develop a biomethane application for municipal solid waste at the nexus of the MRF transfer station. And MRF, for those of you who are not familiar with the waste lingo, it is Material Recovery Facility, so it is where waste is aggregated and processed before shipping off to a landfill or a recycling facility. We are a 45-year-old privately held company. We serve about 2.5 million customers in 42 communities in Southern California. We are square, all our operations are basically in South Coast, so the air issues are major, and we like to think of ourselves as a technological leader in our field.

What we are talking about is a plant of approximately 150 tons per day, or 50,000 tons per year capacity. Now, by scale, it is small. We handle as a company about 1.5 million tons of waste per year, so this is an entry point. The feedstock is processed to be a municipal solid waste, the waste that is going to landfill. And the technology we are using is a process that was developed in Israel called the ArrowBio System and it is a wet separation system that separates the received waste into recyclables and biological component so that you can get the material in a clean enough fashion to go into an anaerobic two-stage digester.

This is the material that we are looking at processing. That is mixed solid waste. Now, you can see the elements of plastic and other remnants, so we pull those out partly by flotation, we break the organic stream -- if you think of waste entering a river, and in the river there are rapids and waterfalls and all the like, well, the heavy material sinks, the light floats, and the biological material gets pulverized and, so, in that way we can pump the biologicals into the digester and not contaminate the digesters. The benefits, as mentioned earlier, are zero carbon transportation fuel by producing biomethane. From my background, I used to be a member of the California Integrated Waste Management Board, so my focus was on recycling, and this is a combined recycling renewable energy system, and that I find very appealing. So we get higher recycling rates, as well as less dependence on landfill, less transportation because we are intercepting the waste at an intermediate location, it does not have to go off-site, all of it. And then I think, more importantly, even most importantly for California, is this is a platform to help re-industrialize the state. The kinds of jobs that are involved are design, and the high-skilled construction jobs, pipefitters, electricians, concrete workers, plumbers, the like, and those are the kind of jobs that we have a dearth of here in the state.

The benefits of this particular process, from our perspective, is that it is modular, so we can build it in units of 150 and you could go to 1,000 tons a day, but you have to start somewhere. It is a small footprint; it is about two acres for a 150 ton per day facility. I think, most importantly for your purposes, is the technology has been fully vetted. We have been subject to incredible review in the City of Los Angeles, the County of L.A., the City of Sidney, Australia, where the first large-scale project is being built now, went through a major vetting of the technology, London, and New York, two other cities. And literally millions of dollars have been spent in the review of the technology by third-party engineering firms. The product, 100 percent green energy and just breaking that down to, well, what if you are producing biomethane from it, the equivalent of -- we estimated about 790,000 gallons a year diesel equivalent, or enough to power about 80 vehicles from that 150 ton per day operation. Roughly 13,200 tons of CO_2 emission reductions per plant, we think this is quite a conservative number, more than 99.5 percent methane recovery. We, too, have looked into the Swedish experience with biomethane and, based on the commercial technology developed in operating there, we expect to exceed Sempra and PG&E quality standards, therefore the fuel, the biomethane, would work on alternative fuel natural gas vehicles which are required, as you know, in the South Coast Air District for new purchases. And a very high record of reliability.

As you saw in an earlier presentation, there is a biogas upgrade plant in Sweden, and this is what our plant would look like, and I will just walk over here if you do not mind. I did not bring --

MR. McKINNEY: Actually, you do need to speak into the microphone, sir, for the -- this is being recorded. I think there is a pointer up there.

MR. RELIS: Well, basically what we are looking at is a 2.5 acre footprint with those tanks. The tanks -- these are the digesters, this is the receiving building where the materials are separated, this is a bio-filter which we have quite a bit of experience with, and a truck fleet. Now, from our view, what are the essential challenges to bringing such a system to California? We can frontload tip fee, low disposal fees compared to Sweden. So the early entry has to have support.

We have another detrimental situation and that is that the federal income tax credits, which you can obtain as a private company as long as you are making a profit, you can avail yourself of the tax credits, they only apply to the production of electricity. So for a project like this, we are looking at a $3-4 million advantage on the electrical side over the production of biomethane. So one of the things I would urge you to work on would be moving towards a parity with electrical generation for biomethane from a tax credit standpoint, because that will really improve the marketplace, so that companies like ours that are profitable can take advantage of that option.

And then the third point that I would urge you to consider, which John brought up, is the ability to move the molecules, as opposed to building all the infrastructure at one site, including the trucks. We operate a fleet of over 100 LNG vehicles, but that fleet is in another location, and a second fleet that will operate on compressed natural gas vehicles is in yet another location. It does not matter, really, where the biomethane is produced, what I think we really want is maximum flexibility to get that biomethane to the transportation sector. So that completes my presentation and I guess I can take any questions later. Thank you.

MR. McKINNEY: Now we have Mike Beckman and Linde Fuels -- Linde, just Linde.

MR. BECKMAN: Okay, great, thank you. Hello, Mike Beckman here, I am the Regional Vice President for Western Region for Linde, and Linde is a global industrial gasses and engineering company with operations in 70 countries around the world, and a large presence in California and the United States here. In fact, we are one of the major suppliers of industrial gasses like nitrogen, carbon dioxide, and oxygen in California. And I want to talk a little bit about what we have done around the world, just very briefly, and play a little bit off John's comments.

We have done biomethane projects previously in other parts of the world, and I have got a picture of the Sweden project we have done because we have been very involved in some of the biomethane recovery and use over there. We have also done landfill gas to LNG project in Altamont, as many of you know, which has been extremely successful, with Chuck White who is going to talk a little bit about it later, and we are going to propose a follow-on project to that, as well, again with our project partner, Waste Management. And then we have also done a similar project in the U.K., which is ongoing right now. We are also involved in LNG around the world, heavy in Australia and other global partnerships, and we also do LNG fueling and infrastructure.

Here is a picture of one of the projects in Sweden and, as I said, you know, John said that they do not have a heavy infrastructure already in place for distributing natural gas, and so one of the solutions that we have come up with is a compressed solution, which you see there in the green box. But it is important to note that this is biomethane that is recovered from waste water treatment. With Linde technology, we purify that, compress it, and distribute it, and help them to use that renewable fuel to help their economy and the environment.

The Altamont Plant, as I mentioned, you know, some of the benefits of that plant to California, a very low carbon intensity fuel, as John mentioned previously, we have estimated 30,000 tons a year reduction in greenhouse gas emissions, it contributes to LCFS, and it is initially used -- I guess Waste Management likes to say -- we use garbage to fuel our garbage trucks, which is really the case at this landfill gas site. It is a phenomenal project and we would like to build more of these plants and that is the next step. This is the largest plant of this type in the world, here in California, I think it is something we can all be proud of, it is both a commercial operation now, which is much more commercial at higher natural gas prices, of course, but also a laboratory for improving the process, the efficiency, so that we can scale up and become more efficient, less energy intensive. And it is in start-up as we speak.

The next project that we would like to do is kind of a follow-on project to this, which would lead to further projects down the road. And, again, this is with our project partners, Waste Management, who have been fantastic to work with here. One of the benefits, or some of the benefits of this plant, will be that we intend to build this plant in Southern California, which is much closer to the majority of the market for LNG today. Obviously, we expect that to grow, but the majority of the market is down in Southern California. This plant, as our existing plant would be 100 percent dedicated to transportation fuels, unlike some of the other biomethane projects, it is going to be a larger plant to, again, help to prove out that next scale production. We are continuing to work on with our existing plant increases in our efficiency, lower power use, more efficient purification processes and, through that technology, it will help to make this an economical venture down the road, implementing design changes, kind of as we speak, on the existing plant which we would like to then build into the next plant. You know, the ultimate goal is to decrease the cost, increase the efficiency, to make this a sustainable and commercial venture. We think that the next plant would target the reduction of greenhouse gases of around 40-50,000 tons per year, compared to diesel and other LNG projects.

I think it is kind of important to know -- to touch on a few points here, broadly -- and, again, John mentioned some of these already, but it is very difficult to do a plant like this when we are trying to prove that technology and make an investment as an industrial company, when natural gas prices are so low, and because they fluctuate so much, difficult for us to justify to our Board a sizeable investment in that arena. And so we continue to need government support for that reason. There are some things that we can do, and David touched on this, as well, but there is this kind of disconnect between the biomethane that is used -- LNG -- the majority of that is produced with pipeline gas today, and there is a significant benefit of that, as John mentioned, you know, it is the lowest carbon fuel, or the lowest greenhouse gas emission fuel from a fossils point today. But if you take the biomethane and create LNG, then it increases it to about 85 percent benefit. I guess one of the points that I would like to make is that, when we look at some of the legislation that is going on right now at the national level, and there is the Biomethane Gas Act, I think it is 1158 in the House, that we really need some support and leadership from the California delegation. I think today we have only four of 53 have sponsored it, so we would like to push for that support, and neither of our Senators sponsored it. And that would give us the benefit of having a tax credit for biomethane, which would put it on some equal footing to biomethane that is used for electricity production. And then the last point there is that the Altamont plant that we have today is, you know, it is a very efficient plant, and the GREET modeling shows that it is a very low carbon intensity; however, the technology that we have there is actually better than what is shown in the GREET modeling. We are continuing to work with CARB and I guess the CEC on trying to prove out that pathway. And that is really what I wanted to cover today, so I guess we will take questions here at the end.

MR. McKINNEY: Well, thank you, gentlemen. A really really interesting -- let me get my thoughts together for a few follow-up questions. And, John White, if you want to contribute to this discussion, you can --

MR. WHITE: Chuck.

MR. McKINNEY: Chuck, excuse me. I think, as I understand it, there are kind of four major feedstock opportunities for biomethanes, you have got landfill gas, wastewater treatment, organic waste from the Ag sector, and then the dairies. And in your view, what seems to have the most promise for kind of getting fuels into the transportation sector, and which ones kind of need the most work?

MR. RELIS: Well, okay, as an operator of --

MR. McKINNEY: Again, if you could speak into the microphone, sir, and identify yourself for the record.

MR. RELIS: Paul Relis, CR&R. We have a truck fleet of about 700 vehicles, as I mentioned. By February, we will have 130 approximately on CNG and LNG. We believe that the -- we understand how to run the vehicles, that is really not our issue, we understand how to build and operate a fueling station, and we understand the economics and the comparative cost benefit with alternative diesel technology. We see the municipal waste stream, having a collection infrastructure in place and a processing infrastructure in place, which is quite unique if you think you are trying to access feedstock for fuel, that is not the problem. We have the complete infrastructure, less the next step to refine the processing so we can separate the biological fraction from the non-biological fraction. And we have waited for the time when we had the right technology to do that. We have been looking at this for over five years. So we think the municipal waste stream, with 2007 40 million tons buried, still over 10 million tons of that waste stream is biological in nature.

MR. McKINNEY: And then, Paul, if I can follow-up on that. So it sounds like you are saying that is a promising source for transportation fuels. What are the next steps to getting that into the market? And who would be your target markets for that?

MR. RELIS: Well, the next steps are to build the first plants. So we have with us today a proposal for -- at landfills, this is it, a MRF transfer, stations so we do not operate landfills or companies, I guess, that are not landfill operator-based. So we need to access -- in our view -- access the pipeline. There are some barriers there. It is not easy for smaller companies to deal with large utility and get clarity.

MR. McKINNEY: So is that the business model, then, to try to work with the utilities and tap the gas pipeline? Or is that as opposed to going directly --

MR. RELIS: That is what we see as the preferred path, yes.

MR. BECKMAN: Yeah, I mean, I might just comment. This is Mike Beckman with Linde. We see value in all the sources of biomethane today, but clearly our focus has been on landfill gas projects and, you know, today there is a significant amount of gas that is released through flaring in the atmosphere that has damaged the environment, and if we can recapture that and reuse that for renewable fuel, it is a pretty significant reduction in greenhouse gas emissions. And to note that, you know, LNG is produced today again with pipeline gas -- the majority of it is -- if we could replace on that with renewable biomethane liquefied at landfills, we think that is a pretty significant pathway to greenhouse gas reduction.

MR. WHITE: Chuck White with Waste Management. I would agree with both of the comments of the speakers. It is a question of the low hanging fruit and, as was mentioned, the landfill gas is really underutilized, less than 50 percent of landfill gas that is currently generated is actually being used beneficially here in California, most of it is being flared. And so it is just a matter of stepping in, and one of the reasons it is being flared, and I will touch on that this afternoon, is that the Air Pollution Control Requirements in California are really stringent, so you basically have not had any new development projects in the Bay Area or South Coast in a long time because of the criteria pollutant concerns from the internal combustion engines that are used to generate power. So the low hanging fruit is really landfill gas, but if you look at landfills, you know, only about one-quarter of the carbon that goes into the waste stream actually goes up in landfill gas that could be beneficially used. One-quarter is in carbon dioxide that you cannot use, and another one-half is in carbon that stays in the landfill forever. So there is much more carbon available in the overall solid waste stream, and that is kind of the next step, as I think Paul has alluded to, is how we could more effectively get access to this carbon and use it beneficially through anaerobic digestion processes, or other technologies that I will talk about this afternoon. But even beyond the municipal solid waste, there is the whole agricultural waste and forestry waste, which I will have a slide this afternoon borrowed from Steve Kaffka and the California Biomass Collaborative that shows that, while there is a huge potential in municipal solid waste stream, an even larger potential exists in agricultural, and Waste Management has traditionally been in the municipal solid waste, but we are looking very much at can we use our expertise in collecting materials in the solid waste stream to expand that into agricultural and forest product materials to be able to beneficially generate energy and biogas and this sort of thing -- corn stover, soybean stubble, all this kind of material could potentially be a real additional benefit.

MR. BOESEL: And, Jim, John Boesel, CalStart. And I would just build on that last point by Chuck, is that I think we have got the infrastructure set up to deal with landfill gas and using that, but I think agriculture could end up being the huge winner here, and an enormous source of feedstock for the biomethane industry in the state, and that is why we would really love to get funding to do one big significant Ag demonstration project. We have a lot of trucks coming in and out of serving California's agricultural industry, it remains the largest industry in the state, it would be great to have the trucks running on not only cleaner fuel to reduce emissions in the heavily polluted San Joaquin Valley, but then to also have them be the lowest carbon vehicles on the road.

MR. McKINNEY: Public comment or --

MR. BRENNAN: Brief public comment. I was going to wait until later. My name is Ken Brennan and I am from PG&E. So I am going to offer myself up as a utility guy here.

MR. McKINNEY: Thanks for coming.

MR. BRENNAN: No problem. Later on in my comments, I can address barriers to entry that were brought up -- different feedstocks that we are currently capable of taking and currently not capable of taking, tariff issues, gas collect testing issues, that kind of stuff. So today I believe 3:30 or so is public comment, around that time, so I will dive into that later. But it is a good time to introduce myself and say I will be out there.

MR. McKINNEY: Good. Thank you.

MR. SMITH: Hi, thank you. My name is Warren Smith, the CEO of a company called Clean World Partners here in Sacramento. I would also like to provide comment on other feedstocks because I think, as AB 32 has been pushed upstream, there are a lot of organizations and companies desirous of making a difference, and taking their own waste at their location, ultimately, and converting that into some form of renewable energy. Our project that we received a matching grant for is a project at the Folsom Prison, ultimately taking their 30 tons of food waste a day, source separated waste, where you do not have the material handling problems that you have at the MRF, ultimately allowing that to be converted on-site, and then creating almost any source of fuel that you would like. In that project, we are proposing to build a CNG facility and it would give you about 1,300 gallon equivalents of fuel a day. My point is that, in the agriculture, there is also in California a very large industry of food processors who are desirous of doing things of this nature. Thank you.

MR. McKINNEY: Okay, thank you. MR. Kaffka?

DR. KAFFKA: Steve Kaffka, California Biomass Collaborative. The Energy Commission has elected the California Biomass Collaborative to do a more intensive survey of food processing wastes in the state and related industries, and I just wanted to make it clear to those who are here, if you would like to help and participate in that, we would welcome your participation. We are going to be launching that in about a month.

MR. McKINNEY: So I think I want to say thank you, Gentlemen, and you have touched on some of the key policy challenges that we see, you know, we kind of have competing public policy goals to reduce NO_x emissions and achieve attainment in the San Joaquin District, and South Coast, and others, and we also have GHG reduction goals, and those do not really match up very well with this particular fuel pathway, and that is kind of a tough issue to work through. And I also appreciate the comments on the tax credit and the tax parities, and trying to create a little more equity between the electricity sector and the transportation sector because I think, in our view, we see tremendous potential for this set of waste steams going into the transportation sector. And I say this purely as a staff employee, because I cannot speak for the Commission on this one, but I was highly impressed with the proposal that this team put together. Again, they really emphasized the use of a low carbon intensity waste stream, and hit pretty much every sustainability criteria that we asked for, it was a very exciting proposal. Again, I just say that as an individual staff member, it has no bearing on how this proposal will be ranked ultimately. But these are good folks to get to know and I encourage our staff, so run up Ysbrand, Bill Kinney, and others working on biomethane, and Don Coe, to introduce themselves to you so we can kind of continue this collaboration. So thank you very much. If we could have the algae panelists come forward, please?

So if we could have Matt Frome and Matt Peak at the table, and then Professor Mayfield will be our first speaker.

So algae are truly kind of the buzz feedstock and fuel opportunity of the day. There is a lot of excitement, a lot of interest, and I dare say a lot of hype and probably some fantasy out there, as well. There is no such thing as a perfect fuel, there is no such thing as a zero impact energy resource. I am very intrigued about this fuel pathway and I am really looking forward to today's panelists. We have a good kind of representation from industry, the non-profit sector, and U.C. San Diego. And as I mentioned to you, Professor Mayfield, since I am kind of in charge of the sustainability issues here for AB 118, I am very curious not just about the market and the commercialization challenges before this industry, but also about some of the sustainability issues, specifically water use, wastewater discharge, and the energy balances because I know some of the processed technologies can rely on those fairly heavily. So with that, I would like to introduce Dr. Stephen Mayfield from U.C. San Diego. And, again, you have 15 minutes for your presentation and I think we will have a good panel discussion at the end of the session.

DR. MAYFIELD: Okay. All right, thank you very much for the invitation. I think my talk is going to be -- this is the 30,000-foot view, as they say, and I will try to not make this a lecture, as I am a professor.

Okay, so biofuels and the ones I think we call -- know about the best are, you know, so biofuel simply means that we are turning photosynthesis into a fuel, turning sunlight into gasoline, as we like to say. And, of course, the best known one is the crop corn. We take that, extract starch from that, ferment that into ethanol, and then sell the ethanol as a blend. Ethanol, as you know -- as many of you should know -- is a low density fuel, it is blended about 5 percent into gasoline, not the favorite fuel of the oil companies, mainly because of this low density and the incompatibility with the existing infrastructure.

We can also produce fuels directly in algae, the one I will talk about today. We make natural oils in that and, as I will show you, those are hydrocarbons, so they are high density, high energy density molecules, and those are cracked directly into gasoline diesel and jet.

Okay, so one of the questions I know, and certainly as I sit here and listen to the methane guys, that sounds great, one of the questions I am always asked, "Well, is algae going to displace other fuels?" And what I always tell people is we need every energy molecule we can get, and I will show you just a few slides to sort of highlight that. This is simply looking at how much are liquid fuels of our energy source, so here is all the energy we burn in the country today, and about 28 percent of that is liquid fuels, those are mainly, as you can see from the blue color, those are transportation fuels. So if we also want to go one step farther and look out a little bit more globally, I think why does energy matter so much, and this is a fantastic slide, this was actually made for me by the guys at Sapphire Energy. And for full disclosure, I should say I am a founder of Sapphire Energy which is an algo-biofuel start-up company. And this simply measures the gross domestic product against the consumption of energy, and here we are right here, so we are obviously one of the highest gross domestic producing countries in the world and we are also the highest consumer of energy. And so what this slide shows is that there is a direct relationship between the amount of energy that you use in that country and your gross domestic product. And there are two alarming things that I like to show. So one of them is, without oil, this is how much our gross domestic product would drop, and so, as I like to tell people, without liquid transportation fuels, we would be no better than the French. Okay? But then the second thing that I would like to point out is right down here, and this is China and India, so this is their usage of energy and this is their gross domestic product, and this is 2.5 billion people. And where these 2.5 billion people want to get to is right there. And the only way you are going to go from here to there is by consuming energy. And that means every single bit of energy that we can make, from now until forever, we are going to need, whether that is biomethane, or fuel from algae, or other waste streams that we turn into energy.

Okay, so every form of energy has limiting factors. Obviously petroleum, it is a finite reserve, and as we burn it, we are releasing greenhouse gasses. First generation ethanol, we all know this argument, this is food versus fuel, the second generation sort of biofuels are turning waste, forestry or agricultural products, and obviously the problem there is how much are we going to have and how easy is it to recover? Electricity, electrical cars, and that is electrical batteries, and the problem there is lithium will actually become rate limiting, and then the half life of the batteries, when you actually have to do something with them when they no longer charge anymore. Hydrogen, the problem with that is we need electricity and we need natural gas to make those things, and then we have to build an entire infrastructure for those. And algae, we really have two big challenges. Believe it or not, one of them is CO_2. One of the biggest expenses we have right now in making fuels in algae is we actually have to pay for our CO_2, to pump it into the ponds. So it is actually limited -- how fast we can grow that algae is limited by the amount of CO_2, and then the second one is cost, and we will talk a little bit about that as we go on.

This slide was made, and this calculation I stole directly from Sapphire Energy, this is actually a lifecycle analysis, so this is measuring how much CO_2 you really consume and put out when you are burning that fuel, and I just want to point out a few things. So this is grams of CO_2 produced per milijoule (MJ) of energy, so this is just grams of CO_2 that you are putting out. So this is if we look at petroleum-based fuels, so obviously when you burn it in your engine, this is driving the car and you are going to put out 74 grams per milijoule. It actually costs you 21 grams of carbon to refine that, to pull it out of the ground and crack it into a gasoline, and so the total output is 95 grams per milijoule. Algae, when you burn that fuel, you get the same carbon outputs, so people always ask me, "Oh, is it less polluting?" Well, it is a higher quality fuel, and that is why that number is 72 compared to 74, but when you burn it, you are still releasing that CO_2. Obviously, where you get the huge advantages is that the CO_2 that you are releasing when you burn that was pulled out of the air as carbon dioxide by photosynthesis. That is the cost right there of turning -- of taking algae and processing it into that fuel. So that is the number we can impact. But even as we are today, the net gain of that is about 68 percent, so it is a very positive CO_2 balance if we were to burn algo-fuels.

Okay, so what are the big advantages of algae over other things? Well, I think first and foremost is that we can use nonaerable land to produce this. So algae is obviously grown in water, it is not grown on agricultural land. The thing about algae is it is about 10 times more efficient than land plants, and the reason for that is because algae will grow every single day. So corn, as many of you know, you plant it some time in May, it really starts to pick up speed in June and July, and it is kind of all done by August, so you really have a very short window to grow. The second reason it is so much more efficient is because we can actually get the CO_2 concentration higher in liquid than we can in the air, and that will drive -- because that is rate limiting for photosynthesis, that drives that rate forward. So ultimately, as we measure yields, which are gallons of oil per acre per year, algae in general is about at least 10 times better than most croplands. It uses nutrients very efficiently and will actually pull nitrogen and phosphate out of wastewater, out of municipal wastewater before we discharge it, so we can actually use algae to clean up the water. Obviously, anybody who has been down to the ocean knows that algae grow in all kinds of conditions, marine and brackish water, as well. Importantly, I think the non-fuel fractions are high in protein and are edible, and this may be -- the co-products that come out of algae may actually be what drive the economics of this. And then obviously we capture CO_2 at a point source, meaning we can put these things near power plants, and we produce high energy dense molecules, as I already said.

So what are the fuels that we actually produce out of this? We could make starch and ferment that into ethanol, but we do not. We make two things, one is called triglycerides, that is fat, and we turn those directly into diesel, and then algae also make hydrocarbons and isopronoids, and we can actually crack those to sort into gasoline. They will also make hydrogen, carbohydrates, ethanol, and the rest of this stuff, but I think these are really the two that are most important because they are truly fungible fuels, meaning they go directly into the existing infrastructure.

This is just the process of how we get it, we grow the algae, obviously it will not be growing in bags at a very large scale, we harvest it and concentrate it, extract the lipids, the fats out of it, concentrate that down, and then that can be cracked into a fuel, and this is simply to show that Sapphire Energy, back in January of this year, took oil from algae, cracked that into jet fuel, and mixed that with some other fuel, and flew a Continental Airline jet on it. So the fuels that come out of this are diesel, are gasoline, and jet. We do not have to change the infrastructure to use these.

Okay, so biologically we know it works, then what are the real challenges? And the real challenges, I think, are going to scale and the economics. And how do we get there? So how are we going to realize economic biofuel production from algae? Well, I think, first and foremost, we need more efficient production strains. So we need strains that produce high levels of the desired molecules, we need to get these guys to survive in agricultural settings or in large scale industrial settings. We have to fit our harvesting and refuel recovery requirements to them, so we have simply as a society never made this investment. And then, obviously, in the end, these things have to be sustainable and environmentally friendly. So what does that really mean? So what I am saying in algae is, we have to do to algae exactly what we have done with all of our other large agricultural crops. Right? So we have the domestication of these, which we have done for every crop. In corn, we have actually spent over 6,000 years doing this, and this is what corn used to look like, that is called tiocente, and we are not feeding too many people in the world, and over the last 6,000 years, we have managed to turn this guy into this guy, and this does feed the world. So we need to do the exact same thing with algae. And this is simply to point out that there are no commercial systems that just use wild type strains. So more or less, here is where we are right now, and we need to get to there. And when we do get to there, I think that is when we will have the efficiencies that will allow us to drive the economics of this.

All right, so what do we need to achieve these? Well, we need a much bigger and better knowledge base of algae. We need to identify and characterize the diverse set of species. Some estimates are that there are 500,000 to a million different algo species out there. We need to figure out what those are. Then, importantly, I think, we need to develop the genetic and breeding tools so that we can do to algae what we have done to all of our other agricultural crops. We need to develop the molecular tools, obviously, because we need to do this in an accelerated timeframe. We do not have 6,000 years to turn algae into something wonderful. We have to get there a lot quicker, and we are going to do that by genetics, by molecular genetics. And then, importantly, we need to develop the agricultural practices that will allow us to go to this very large scale.

So this is simply to point out that algae, when people say "algae," right? What does that really mean? This is simply a biogenetic tree, so this is the diversity of species across the world. And I just want to point out two things: that is people, Homo Sapiens, that is ceelegenz [phonetic], that is a little worm. That is how closely related those two species are. I do not know about you guys, but I think I am pretty different from a worm, but if we look at genetics, that is how close we are. That is red algae and that is brown algae; that is how far apart they are, and up here someplace is cyan bacteria. So that is the span that we looked at when we talked about algae. So there is good news and bad news from that. The good news is that we had this fantastic diversity of species that we can draw upon. So we have not even begun to look at everything that is out there. So the potential is there. The bad news is that, because of this diversity, and because of the poor investment that we made as a society in studying these wonderful little guys, we have a long way to go to get from our source genes to our production strains. So really what we need to make an investment is the genetics and engineering of these little guys.

All right, and this is simply an example of that. So I simply went to Pubmed, which is what professors do, this is how you look at publications. But what this really is, is just a crude way to assay how much of an investment we have made as a society into this. So this is every single algo species that I could find, and here is the number of publications on every single algae out there. That, you know, so the best one out there is about 4,600 above, okay? That is the bacteria e coli, and over that same 15-year window, there were 220,222 publications on that. So, really, what that just tells you is that the investment in all of algae is a fraction of what we put into a single bacteria. And I think that is really the number that has to change.

All right, so where do we go from here? So first of all, I think we have to develop a much better knowledge base for these wonderful little beasts. We have to develop the molecular tools that will make algae into a biotechnology platform. Now, what we are here to talk about today is the ability to make biofuels, but in fact, this is a fantastic system for making lots of things. And I have spent a fair amount of time in my lab actually making therapeutic proteins and now nutraceuticals in the sky. Included, there is going to be an opportunity for that, for very many other high value, low carbon, green technologies to come out of this. We need to develop the strains of algae that will allow for economic biofuel production. Importantly, and this is what we have just now begun to push into, we need to develop the industrial practices for growth and harvesting and recovering, this is where most of the energy and most of the money is spent. We can impact those from both the engineering side of things and from the biology side of things, and we are doing just that. And I would argue that we need a national center for algae so that we can come up in the end with something that I think is going to look like this, and that is that we are going to take wastewater, or very poor quality waters, we are going to take waste carbon dioxide from power plants, we are going to use sunlight, and we are going to convert these things first into high value co-products, second into the lower value biofuels, and then, finally, into these proteins which can either go along as animal feed or perhaps into anaerobic digesters to be made into methane. But I think what we have to do is get this whole process working together, and that is what really will drive the economics. And how we are going about doing that is we built the San Diego Center for Algae Biotechnology, it is housed at U.C. San Diego, you can look us up online there. And more recently, the Department of Energy just last night submitted a proposal of a consortium because the Department of Energy has now put up Development of Algo-Biomass Consortium, that is the call number, it is a consortium for algo-biofuels, we are calling ourselves The Consortium for Algo-Biofuels Commercialization, CAB-Comm. Here are all the partners, many of them in California, and importantly, what we are doing in this is we are interacting with industrial sector partners, so these are the real guys who have the rubber on the road. So here are all the academic geeks who are going to work on this, and work on the biology part, and here are our partners, Chevron, Sempra, General Atomics, Live Technologies, Sapphire Energy, etc., and I think it is going to be the combination of these things, of these two groups working together over the next three or four years, that I hope we will really see some great growth in terms of both the economics and the scale, if we can reach those. And I hope I stayed on time, and I will send it there.

MR. McKINNEY: Perfect. Thanks very much. I have one follow-up question for you.

DR. MAYFIELD: Please.

MR. McKINNEY: You mentioned your development of jet fuel and it seems to me that that is a high value commodity for an industry, a transportation sector that is going to have a pretty high carbon debt load. Do you see that as a promising, say, market opportunity, or are there pitfalls on there into creating that high quality jet fuel?

DR. MAYFIELD: No, I think that is probably the number one market right now. I think many of us imagine that. For one, not to be too cynical, but the Department of Defense is a little less cost sensitive than some other customers, and obviously they are really big users of jet fuel. Actually, the airline industry is very cost sensitive, so you have those two different sides to it, but I think with the Department of Defense, it is clearly something that they are looking into. My lab is actually funded by the Air Force to work on biofuels out of algae for just that reason.

MR. McKINNEY: Well, thanks very much, Professor Mayfield. Our next speaker is going to be Matt Peak with the California Algae Fuel Products.

MR. PEAK: Hi. My name is Matt Peak. I am with a company called Prize Capital. We are a start-up firm working to implement a proprietary financial mechanism that helps to create clean energy and environmental industries.

And I wanted to talk today about the efforts that we are undertaking to spur California algae fuel production. And I would offer these perspectives from a company -- we are, as I mentioned, a financial firm -- thoughts on algae fuel from the perspective of an investment firm that has a strong interest in investing in California-based algae companies. So, starting with a question: why California? Well, California, to start with, has a very strong algae intellectual resource in the cluster that is emerging in San Diego. And as Steve Mayfield indicated, there is a lot going on there. There is the newly established Center for Algae Biotechnology. And then there is a cluster -- this map was created based on work by John Benemann, and we updated it in a couple of ways, but it is already out of date, indicating 12 centers and eight companies. The cluster is strong, it is growing, and it is attracting a lot of attention and money.

Another reason why we are focused on California is because of the diversity that California offers. And this was touched upon in a previous discussion about various barriers or things that are being worked out by the industry, and this is something that we have become very familiar with, as we have been doing our diligence. There are many different paths that one can go down in order to produce fuel from algae. There are different genetic approaches, infrastructure approaches, energy absorption, ways to harvest algae, heat balancing, and there are different variations of a final product. And so just looking at one of these issues, so the infrastructure approach is to highlight California's strengths. Different infrastructures require different climates in order to perform optimally, and what is exciting about California is there is a variety of climates here. There is the Imperial Valley, which could potentially be a very strong place to produce algae biofuel. There is already select producers there ranging from Carbon Capture Corporation to Ken [phonetic] Bioenergy, Sun Eco, and Earth Rise Farms. There is also the rain north which could be good for testing out various open pond systems, which through evaporation change their salinity, change their acidity, the nutrient compounds, and it is essential to replenish that with water. The biomethane facilities that have been discussed, algae can be used for gasification. When combined with other feedstocks, it can actually make the gasification process more efficient. And then, finally, coastal facilities, there are some manufacturers that are looking at ways to produce algae using open ocean saline approaches. Now, the interesting thing is, is we are focusing why in California, but there are other states that are luring some of the leaders. So in New Mexico, Dr. Mayfield's company, Sapphire

Energy, is setting up their pilot facility, and it envisions expansion there. In Arizona, there is a strong consortium recruiting a variety of players. I mention in this slide potentially General Atomics, but Dr. Mayfield told me before this session that they are actually headed to Texas, which is also on our map. There is a strong consortium there. It helps that the petroleum industry is established there. And there is strong academic resources there, as well. So that is why California.

Now, looking at Prize Capital's algae investment priorities, as I mentioned, we want to invest in California algae companies. What are the priorities that we are going after? Well, we are looking for companies that are committed to employees for production, not just R&D. And what you will find by looking in this industry is that, first of all, there is a lot of money that is focused on research and development. Exxon-Mobile got a lot of press by investing over $300 million in Synthetic Genomics, which is the San Diego based firm, but when you look at the structure of that investment, it is an R&D play over a number of years. There is also a lot of talk, but there is small delivery. If you actually were to quantify the amount of transportation fuel that was being produced by various algae companies, it is quite small at this point. So Prize Capital is looking at ways to invest in companies that are poised for production. We also want to invest in companies that are poised to meet the highest environmental standards, and what is challenging about this is that the standards for algae fuel are either in development, they do not exist, or they are misaligned. And there are four key criteria -- there are multiple criteria, but the four major ones that we see is energy consumption -- so this goes to your original question about what the energy balance is -- there is water quantity consumption, water quality consumption, and then the discharge of that water. And so we are sorting through and we are looking for mechanisms that can sort through companies that are poised to do well in each of these categories, so as these regulations are defined, they can either help define those regulations or be above and beyond where those regulations come out. So the mechanism that Prize Capital uses to source these types of companies is the inducement prize mechanism. What the inducement prize mechanism basically is, it is a promise to pay, or a promise to give an award should an objective be accomplished. And prizes actually have a very long track record, going back hundreds of years, of sorting through complex questions in industries, overcoming very challenging technological and other barriers to create new industries. And two examples of successful prizes was the 1927 Orteig Prize, which jumpstarted the commercial aviation industry, it was basically a $25,000 prize that was offered, spurred Charles Lindbergh's crossing of the Atlantic, and the key statistic here was, after the crossing of the Atlantic, commercial aviation passengers went from 6,000 to 180,000 passengers in 18 months. Another very successful prize competition that kind of rejuvenated large scale prize competitions was the 2004 Ansari X Prize, which was a $10 million prize for a private three-person reusable spaceship, flying 100 kilometers high, two flights in two weeks. And the real interesting statistic from this is that 26 teams chose to chase the prize and collectively spent $100 million, so you have the ability with a prize competition to leverage a lot of money going after a given goal, and creating new industry that today is commercialized at over $1.3 billion. Also, this was a very interesting quote that I wanted to recite from a prize competitor in the Ansari X Prize: "I recruited a highly educated and skilled aerospace team, started a small commercial space organization in a country where that is unprecedented, and dedicated all my spare time and money to a contest that I was sure we would not win. That is the power of incentivized competition."

So Prize Capital is looking to do the same with the California Algae Fuel Prize. We have been working with our collaborators, prize development, collaborators of the X Prize Foundation, and other industry experts over the past

14 months now, to sort through the key challenges in the algae to fuel arena, and to construct prize rule sets that could help overcome those challenges, and jumpstart a new industry. And the prize development process is proven. There is a video that is linked to this one slide that is about three minutes long, that I briefly wanted to show you. Is there audio? Why don't we just continue with the presentation, then? But I would like to offer -- this video, what it is good at, is it is good at showing in pictures illustrating sounds and words what words cannot do, and that is the diligence process that we have undertaken. And this culminated in April of this year when we held an algae fuel prize workshop that brought together over 20 leading experts from around the country to sort through the various prize platforms, identified where the challenges are, and to generate a prize, a new draft prize rule set that could -- that the industry believed could overcome complex challenges and then could not compete with R&D funding, not compete with venture capital, or other efforts, but actually compliment these efforts. And we were very encouraged coming out of this workshop to learn that these people that were brought from Academia, from National Research Institutions, from large corporations, such as BP and Shell, that there was near unanimous consent that a prize competition could do that, could help compliment this.

So what we have right now is a current draft rule set that articulates the team that produces the most finished renewable diesel fuel per acre of land, so that first component focuses on productivity per land area, the fuel growing and production system occupies between January 1st, 2011 and December 31st, 2014, this is a multi-year period, acknowledging the fact that algae fuel can go through phases in production given climactic conditions, so if it is a good year, if it is a bad year, and we wanted to incentivize the industry to persevere through whatever good years, bad years may come along, and also come up with streamlined production mechanisms, rather than batch processes for producing fuel from algae. With a minimum of 3,000 net gallons produced per acre, so we looked at net gallons, acknowledging that energy balance, saying that we are going to only count towards the awarding of this competition those gallons of fuel that are above and beyond the energy inputs that it took to produce them, at a cost of no more than $3.00 per gallon, so focusing on the affordability component. Now, that is the sound bite, but we also go into greater detail as far as those criteria that I outlined before, net gallons, what that exactly is. The final finished fuel, we specify explicitly that it is an ASTM D-975 diesel fuel, not a biodiesel or a vegetable oil. We look at water quantity, so looking at what is sustainable, especially given California's climactic conditions, and so we articulate less than 3-acre-feet of water per acre of land. And we also looked at water quality, so focusing on municipal waste water, sea water, or brackish water, getting rid of that competition for drinking water component, and then also water quality, so looking at what the outputs would have to be in different regions and focusing competitors on meeting the various goals for those regions.

We also acknowledged that what is required to jumpstart this industry, to jumpstart the transition to widespread use of alternative fuels is not just a summation of projects, but also a change in public perception, something that engages the public and can help spark a social movement. And the component in our prize competition that helps to do this is the annual championship racing prize series, which basically takes competitors' fuel, runs them in sponsor-provided racecars around prestigious California racetracks, and awards competitors' prizes based on the number of laps that they can go while maintaining a minimum fast speed. What this does is it engages the public and it helps provide a very visible metric for showing how much renewable diesel fuel from algae is being produced in California by competitors, and how that amount progresses from year to year.

Now, what Prize Capital introduces to prize competitions is that we bring financial innovation to prizes that can help fully leverage those prizes. And historically in the past what prize competitors have been left to do is they have been left to go out, use the attraction of the prize competition to help them raise funding. And what Prize Capital does is it does that for them, and the tool is basically an empowering tool for especially small scale producers. So, while in the past, prize competitions have been very good at attracting large competitors, those that are very well resourced, Prize Capital helps the small guys by arranging venture capitalists to come in, invest in a portfolio of companies, and then also providing additional capital on top of those other venture capitalists that Prize Capital is working to arrange, to empower the competitors to form a stronger competition, and lead to, you know, the eventual goal that the prize competition articulates. And the goal of this is basically -- sorry, I skipped through that one -- is to direct more venture capital investment into California. So what we are looking at is the circle by the red oval. The amount of venture capital that went into algae biodiesel expanded by almost six times in the period of one year. In the prize competition, it is meant to direct that more towards California. Working with the prize competition itself, bringing together new innovative players to set up shop, produce fuel in California, Prize Capital then potentially provides working capital in production facilities established in California.

So three recommendations that could help this model. First of all, California has the potential to be a leading algae fuel producer, as articulated in this presentation, and also elsewhere. So we would advocate targeting Energy Commission funds that enable the state to reach its potential, definitely focusing on the R&D component, but also targeting those that can lead to on-the-ground production. Secondly, California funds are limited. The amount of money that is in the AB 118 program is limited, so we advocate maximizing those benefits and, to do so, directing a portion of the Energy Commission funds towards mechanisms that are able to leverage private funds to maximize the return on investment by the Energy Commission. The third recommendation, price competitions have a over 100 year -- hundreds of years demonstration to create new industries. Prize Capital's venture finance mechanism has the potential to help fund these new industries. We articulate allocating a portion of annual AB 118 funds to leverage private capital through prize competitions. That is my presentation. I am happy to take any questions that you have. And thank you very much for the opportunity.

MR. McKINNEY: Great. Thanks very much, Matt. Very very interesting. I do have one quick follow-up question. Is part of your business model -- I think you are saying that you identify investment opportunities for your capital fund. Do you also get licensing agreements? Or do you have specific rights to technologies or patents that may win your award?

MR. PEAK: So what Prize Capital does, the details of our model, we are a passive investor in competitors who go out and seek funding from venture capitalists, whether we have assistance with that, whether they are able to find that on their own. And we are able to do this because we do not look for in-depth knowledge of the company, we do not look for exposure to the i-Key, we do not look for any knowledge about what the company is doing or how they are doing it, we simply wish to add investment to companies that are already able to go out and find investment on their own. So, by doing this, we hope to take a stake, ideally, in every competitor in the competition. You know, helping to empower those to go out and find financing, and then tagging on additional capital of our own, and what that does for us is it gives us a diversified portfolio, and what it does for the prize competition is create stronger competitors.

MR. McKINNEY: Okay, thank you.

MR. PEAK: Sure.

MR. McKINNEY: Our third speaker for this panel will be Matthew Frome from Solazyme.

MR. FROME: My name is Matthew Frome. I am with Solazyme. We have been talking about algae and the way to create transportation fuels. Solazyme takes a very different tact in the way that we grow our algae, although there are significant amounts of overlap in terms of processing and the types of fuels that we can use, and a lot of the co-products that are available. And what I would like to do is talk today about Solazyme's technology, use it as a framework to try to help answer some of the questions that the CEC was asking.

So first of all, I just want to talk briefly about Solazyme and the fact that what we really try to focus on is becoming a renewable oil production company. We happen to use algae as our microorganism to do that, and there are lots of great reasons for that because algae really are the best organisms on earth in order to make that. And so the focus is on scalable fuels, but we also see other opportunities in chemicals, edible oils, and also in co-products, whether that be an animal feed, or human nutrition opportunities.

Some of the things that Matt Peak was talking about, we think that production is a really important part of showing how the companies are moving forward, and we are really one of the first companies to scale algae oil production. We produced thousands of gallons both here in California and abroad, across the United States. And we have been producing oil now successfully for a number of years and have been making that into fuels and other products.

So I think that one of the important questions is really why do we want to use algae and how can that help impact California's energy needs. One of the things I think a lot of people now know, given all the hype with algae, is they really are the original oil producers. Most of the fuel in people's cars really originated with old algae blooms and the kind of energy that they want to use as an energy storage mechanism is exactly what you want in a transportation fuel, something that is very dense, something that can be utilized, and does not require a lot of space. But it ends up, as I think Stephen talked a little bit about in his presentation, that algae can make a number of things with the energy that they capture with the sunlight, they could make and they do make carbohydrates in some cases, of course they make cell biomass, they make proteins. But the first step of that process is always making it into some kind of chemical energy, some kind of sugar, and then you take that chemical energy and, as a second process, you convert that energy into oil. And, really, that is what

Solazyme does, we really split these two parts of the process into allowing the algae to take advantage of what they do best, and that is producing oil, really the most efficient organisms in terms of making oil. And the way they do that is that, although usually you think of your algae in your pool as a nuisance, as something you have to clean up, but the truth is that they do not have to grow in sunlight, they can be bathed in their energy, they can be bathed in sugars, and they will grow very quickly, and that is what is called heterotrophic growth, as opposed to autotrophic growth from direct photosynthesis. So what Solazyme does is indirect photosynthesis, we still take carbon dioxide from the atmosphere and bring that into chemical energy, but we allow other plants to do that work for us, and then we take those plants, feed those to the algae, and create lipids and oils, so we can make different kinds of fuels. And so it really -- it does a couple of different things -- it is a very quick way to be able to make oils, whether that be for diesel fuel, or jet fuel, or other kinds of fuels, as opposed to alcohol which, as we have talked about earlier, has some limitations in transportation. But it also allows us to use preexisting industrial technology, the types of technologies that are necessary to do large scale fermentation have been around for many decades. And so we are able to scale up the technology quickly and bring it to the commercial opportunity much faster.

So one of the things I just wanted to show you that we are in fact growing algae. One of the issues with growing algae is making sure that it has enough oil content. This is two different microscope technologies, as a matter of fact, two different algae, but they are both over 70 percent oil that we are able to grow to very very high concentrations and be able to extract that oil and turn it into all sorts of great different fuels.

So, again, just to be clear, Solazyme's technology does not use open ponds, we do not use what are called photo bioreactors, we use typical fermentation technology, we feed our algae carbohydrates, including sugarcane, cellulosics, industrial waste streams, and one of the great things about algae is, because they are so diverse because they have to live in such demanding environments, their ability to be feedstock flexible in our process is very very high, and so we are able to use lots of different types of biomaterials that are available in California. And again, the technology is decades old. We are able to take advantage of those kinds of processes and facilities that are already available, which is why we have been able to make as much oil to date as we have.

So I think one of the things that is important to know about Solazyme is I think we are the oldest algae bioenergy company around. We were formed in 2002 and, in fact, started the company based on photosynthetic autotrophic application. And because we are a small company and realized that we had only a small window of time before we could take that technology forward, we started to realize that some of the issues with growing algae phototrophically, the time it takes to grow the oil, the amount of oil that you can get into the algae over time, and the costs and effort that it requires to extract and then process that oil was going to create some cost issues for us. And we were able to then look at another way of doing this, and that is when we started working on heterotrophic growth a few years later. And so what we really see as a way to be able to move algae oil into commercial production as quickly as possible really requires a low cost technology in the heterotrophic process because you are able to create so much oil in the algae, and be able to do it in such a short amount of time, that allows us to be able to hit the cost targets that are really required in order to be able to meet the commercial expectations.

I mentioned a little bit, but there has been a significant amount of discussion here over the past two days, and even later this afternoon on the types of feedstocks. Yesterday, we talked about sugarcane and the

Imperial Valley as an opportunity. Steve Kaffka was talking all about the different types of feedstocks that can be grown in California as we start to run up against waters issues, whether we are talking about salinity issues and, again, one of the advantages of algae and their feedstock flexibility, it allows us to look at sugarcane, it allows us to look at sorghum, allows us to look at even forest residue as potential feedstocks that are available within California for large scale production moving forward. And, in addition, because of, you know, again, the carbon dioxide originally is coming out of the air when it is through photosynthesis through these different feedstocks, the greenhouse gas emissions are very good, greater than 80 percent of reduction in lifecycle greenhouse gas emissions, through some work that we have done with Lifecycle Associates, and I think we have heard their name up here a couple of times today already, as well.

So, again, I wanted to just reemphasize that Solazyme has, in fact, made fuels. We have done this at commercial manufacturing scale. We have made biodiesel which works very very well, from a vegetable oil processing, but we have also made the renewable diesel, the D-975 type of fuel that the algae prize is interested in promoting. And we have also made jet fuel, as well. We have been driving this for, well, I am trying to think, probably over a year and a half, and we are 100 percent algae fuel, been doing it for thousands of miles in unmodified engines, and so it is a perfect and simple fit directly into the current infrastructure. There is not a great change and expensive expanse to be able to utilize the algae fuels that are produced.

Again, just in talking about the types of demonstrations that I think we need to look forward to, we recently signed an R&D and Demonstration Agreement with the Department of Defense to make F-76, which is Naval distillate, which is -- it is basically a diesel fuel that has some specific requirements, but for all intents and purposes, it can be the same as a D-975 fuel. And we are going to be delivering within the next year 20,000 gallons of renewable F-76, made 100 percent from algae, which I think, again, talks a little bit about the types of things that are important in terms of production, and showing that this technology is not a long ways away, it is something that we are able to produce now.

So I just wanted to end with looking at some of the workshop questions, I think these are probably a little too small for everybody to read. But, you know, these were the five questions that they asked the algae panel to try to address. And so, you know, what needs to happen in the market, technology, or policy arena for biofuels to be commercially produced in California? I think what we really need is in-State demonstration of algae fuel production, based on California feedstocks. And, you know, those feedstocks can either be agriculture, or even waste streams, there are lots of different opportunities. But I think we need to show a demonstration of fuel production, I think that is important. You know, more basic research is needed before commercial production begins. It is clear that there are still a lot of things that we can learn about in terms of algae growth and algae R&D, you know, we have been growing yeast to make ethanol for a very very very long time, and I appreciate it since I like my wine and beer. But the truth is that, you know, no, we do not need a lot of basic research in order to show -- to get to commercial production at a terrific growth this past, proven concept, and it is really now time for a scale-up in cost reduction development.

What production technologies are best suited to California's constraints? I really do think that heterotrophic algae production is synergistic with California's agricultural practices and environmental goals. We have a very healthy agriculture sector and there are lots of opportunities for other waste products that are available. What are the environmental and sustainability issues associated with commercial scale production in

California? Is water use a limiting factor? Our production technology really requires very little water and, so, as long as you are able to utilize drought and that saline tolerant plant species, as those continue to be developed, as we are able to utilize better agricultural practices, I really do not think that those are going to be significant issues moving forward. And how can AB investment monies be used to accelerate demonstration of commercial production facilities? I think it goes along a little bit with what Matt Peak was saying. I think grants for California demonstration of algae fuel production and technologies would be a great way to be able to move those things forward. And that is really what I wanted to talk about today. Thank you.

MR. McKINNEY: Great. Thanks, Matt. I do have a quick follow-up question before you go the speakers table. You talk about your production process being able to use multiple feedstocks available in California, both purpose-grown crops and waste streams. Could you comment briefly on the pros and cons, say, purpose-grown feedstocks versus waste stream feedstocks?

MR. FROME: Sure. I cannot believe that I did not mention this. You know, part of the things -- one of the other programs that we are working on is actually with the CEC on cellulosic-based feedstocks and so, you know, we are really excited about the partnership that we have had with the CEC moving forward. You know, I think in terms of feedstock availabilities, there are a lot of really good reasons to try and use different waste streams as best as possible, and I think that there are a lot of those available within California, whether those be agricultural waste or, say, biodiesel production wastes. I think, in the end, there is going to have to be a balance between the two because there is really only so much waste. We generate a lot, but there is still a limited amount.

MR. McKINNEY: So one of the issues we see, say, with ethanol production and waste streams is, you know, the transport costs from the source of that waste product to the bio refinery. Is that an issue that you think is surmountable? Or how would your company approach that?

MR. FROME: No, it is definitely surmountable, but it is an issue. I think that the transportation costs are going to be important, so you are going to have to size your bio refinery appropriately. You know, out of a bio refinery is going to come a number of different products, there is going to be a transportation fuel, there will be nutritionals of some kind, there might be some other types of products that come out of it, but what you need to be able to do is size your technology appropriately so you can bring your feedstock in cost-effectively, because if you cannot do it cost-effectively, then the whole system is not sustainable.

MR. McKINNEY: Right. Okay, well, thanks very much. And I have one follow-up question for all the panelists, and I do not want to put David Effross on the spot, but Dave is our technology lead in the PIER Program, Public Interest Energy Research Group for Algae, and Dave, I do not know if you want to comment briefly on the PIER grant, the size of that, one of the fun things of working at the Commission is I go to public workshops to learn what my colleagues are doing down the hall, so I do not want to put you on the spot, but --

MR. EFFROSS: Should I step to the microphone?

MR. McKINNEY: Please.

MR. EFFROSS: This particular grant was issued. We got several responses to our solicitation for direct biosynthesis of alternative transportation fuels. We ended up funding three projects, each one in the neighborhood of $800,000. One of them went to Solazyme, one of the grants went to NASA/Ames, and one of them went to Menon & Associations. We are funding projects that cover autotrophic algae, phototrophic algae, and bacterial fermentation for fuel production.

MR. McKINNEY: Okay, thanks.

MR. EFFROSS: Thank you.

MR. McKINNEY: So my one follow-up question to all the panelists is, I think all of you have referenced the large amount of research dollars that are needed to kind of continue moving this process technology along and get to pilot scale commercialization. You have also referenced, I think, tens, if not hundreds, of millions of dollars, and research funding from a variety of sources. Again, given the modest amounts of money available through the AB 118 program, do you have specific recommendations on how that money could be used and for specifically what types of projects, and how much funding, and what type of funding?

DR. MAYFIELD: Okay, I will start that from the perspective of a Professor at a University. So one of the things that we strive to do at the San Diego Center is that, although we can say right now that we are ready to launch a pilot plant, and Sapphire and Solazyme have, and others are, the reality is that the economics of those are unlikely to be competitive with today's petroleum prices, and we have to get those down. And the way you get those down is by continued and continuous investment in basic research. We are -- I do not want to say -- behind, compared to other systems, because I think the potential is fantastic in algae, but I think what we need to do is get the pilot facilities up and running with the understanding that it is going to be continued improvements on the system that will really drive the economics of this. And so I think, in the end, you have to have a portfolio that includes demonstration plants, so that people can see that this is real, so that you are really driving cars on this and flying planes on it, and at the same time, the understanding that the economics are unlikely to be there today, and we need to push those forward, and that clearly is going to requite some basic research. And basic research both in the biology of the organism, in the production facilities, and the engineering of the production facilities, and some research in the modeling and the understanding of how we are going to utilize water, how we are going to utilize land, how we are going to go to the scale that we need to go to. So one of the things that we have not talked about is scale today. You know, we burn over 150 billion gallons of fuel in this country every year, and algae, now we can probably hit 3,000 gallons per acre per year, that -- Matt put that up there -- and I think that is a realistic one that we can get to today. And I think we can push that to 5,000. But if you do the math on that, that is still 30 million acres to replace our liquid transportation fuels. So we have to have some understanding of all these things are possible to do now, but what scale can we go to? The biomethane guys that talked earlier, clearly these are systems that are working, but how much of our fuel does that really displace? And if we really want to make a difference in greenhouse gas emissions, we cannot displace 2 or 3 percent of this thing, we have got to get it up to the 30-40 percent. So I think we need a bit of research on that end, as well.

MR. McKINNEY: And if I can follow-up on that with you. So you wear two hats, your business man and a Professor, so, say for your Pacific firm, if you could share with us, if you were to, say, make a funding research recommendation, or pilot plan funding recommendation to us, what would that look like? I mean, how much are we talking? For what specifically -- what types of activities would you like to see funded?

DR. MAYFIELD: For a pilot to actually --

MR. McKINNEY: Well, I guess I am trying to get kind of a clearer sense for, say, in your mind, if you put your hat on for Sapphire, what is the next step? How can, again, we have got a modest amount of money with AB 118, is there kind of a strategic application of that?

DR. MAYFIELD: Well, I think part of that is -- I certainly do not want to quote the numbers because I do not know them that well, but I do know that the Department of Energy and the U.S. Department of Agriculture have put forward bio refinery calls, and those are on the tune of $500 million to $100 million to build a pilot facility, and I know that Sapphire and many others have applied for one of these bio refinery grants, to build one of these. The basic numbers are 300 acres to build a pilot facility in the 10's to 20 thousands of gallons per year production coming out of that. But I think it is -- I am not certain that -- there must be some way to leverage the CEC's funding without going to the point that the USDA did, or the DOE, to be able to say we are just going to pay for these things outright, or give a grant outright, or a loan on those things. So I think there must be some way to put an incentive to have these things built in California instead of someplace else, to allow these fuels to be produced here.

MR. McKINNEY: Thanks.

MR. PEAK: Building off -- I do not think my mic is on.

MR. McKINNEY: Push the button there.

MR. PEAK: There we go. So building off of Dr. Mayfield's comments and looking at this from the Prize perspective, I could see the PIER Program being a very valuable component and a resource to the competitors that the Prize competition attracts. If you envision the competitors that would be drawn to the competition, they are going to be experiencing a wide variety of technological challenges. Each team, I could envision coming to the table with a different set of strengths, different set of weaknesses, and looking for R&D dollars to overcome those weaknesses. This could be a powerful way to augment the competition and also addressing the fact, as you had mentioned, of a limited amount of money. These competitors would be coming to the table with an amount of financing from other private investors, from possibly Prize Capital, and elsewhere. I can envision, you know, the PIER Program tying in a component to competitors in the Prize competition that have received a degree of private funding to match up to a certain amount of that funding, and thereby making these strong teams even stronger, and focusing more of the outcome on production in California.

MR. FROME: So to sort of reiterate a little bit about my last slide, I think there is a spectrum of things that the AB 118 program can work on. I do think that R&D through demonstration is important, you need to be able to show to people that this is a real technology, that this is not just a future idea. And so I think that a significant focus should be on demonstration of fuel production from algae. I think also reiterating something from yesterday in trying to tie those funds into other government funds, whether those be ARRA funds, it gets to be really difficult for a small business to try and move those two things together, the timing is always not right, and the requirements of what the federal government is going to ask for versus what the state is going to ask for just gets to be really really difficult for a small company. And so, you know, linking it to private investment, I think that is okay, but trying to link it directly to federal dollars becomes really unmanageable, I think, from a small company perspective.

MR. McKINNEY: I think from the State of California perspective, we might agree with you on that, as well. Okay, kind of as we continue to participate in this process, you know, algae is a new fuel pathway for us, again, Dave and the PIER Program is kind of heading that up for the Commission, but I think we need to better understand really what amounts of money, how that could be applied. I would say one thing we heard yesterday from some of the ethanol producers is that, you know, some type of feasibility study funding, permit assistance, development funding, that type of thing, before you go to the capital costs associated with the pilot or commercial scale facility, is something that could be useful. So I do not know if that applies to your industry, as well, and you do not need to answer that now. But as you continue to participate in this, we would really like to learn more about kind of the immediate funding needs to understand how we can assist. Okay, with that, thank you very much, gentlemen. Very informative, very interesting. We are going to do a slight agenda modification here and take a 10 minute break. And after that, I would like to ask the first set of feedstock panelists to make sure your presentations are loaded on the computer. Kay Martin is the first speaker, if we could have you assemble at the speakers table at 11:20. Thanks.

[Off the record at 11:12 a.m.]

[Back on the record at 11:29 a.m.]

MR. McKINNEY: So I will ask people to take their seats and I will ask Ms. Kay Martin to come to the podium. So, one of the really controversial issues with biofuels production and ethanol production in California are the feedstock sources, and there is a lot of pros and cons to purpose-grown energy crops and waste stream feedstocks, and specifically with the purpose-grown crops, there are a lot of concerns from different segments of our stakeholder groups and communities at large, and there is also just tremendous opportunity kind of with the agricultural might and know-how that we have in this state, and I think we are on a continuing search to understand which of those purpose-grown crops can be best suited to California's natural resource constraints and sustainability concerns. On the waste stream, you know, where are the barriers to entry? What are the limiting factors? What is it going to take to get very promising waste streams from the Ag sector, from the forest sector, from municipal solid waste and others into the fuels and technology market? And then also, what are the opportunities for the very high volume producers potentially coming in from overseas, whether that is South America, Southeast Asia, or at some point Africa. So we have two panels, one before lunch, so we will push through until about 12:30, I think, and then take our lunch break. So our first speaker today is Dr. Kay Martin with the Bioenergy Producers Association. Dr. Martin.

DR. MARTIN: Thank you. I am with the Bioenergy Producers Association, as he said, and that is an association which is actually a coalition of public and private agencies that are dedicated to the commercialization of clean industries that produce renewable power fuel and chemicals from Ag, forestry and urban sources of organic biomass waste. Our membership includes bioenergy firms, it also includes electricity, utilities and also waste management firms. Today, I am going to be focusing on the utilization of urban waste feedstocks and I am going to be talking about it primarily from a policy overview perspective because we have fortunately with us today also a company called Fulcrum, and they can provide an example, the company that has a technology that is ready to go to commercial scale.

I think everybody agrees what the problem is, what the challenge is, and that is to create a new energy platform that addresses the issues of both climate change and sustainability. About 10 years ago, the U.S. Department of Energy came up with this graphic, and it was at about the same time that President Clinton issued his Executive Order establishing the National Bioenergy Initiative. And this diagram was their way of depicting a way in which we could conceive of biomass substituting for petroleum as a primary feedstock in order to close the carbon loop. And I suggested at that time to Bob Harris, who was heading up this program in Washington, that we really needed to add another arrow on this, and that is the lower arrow of urban biomass wastes. And I think my comments this morning are going to be focused primarily on the need for California to add this arrow to its repertoire, as well.

I will focus my comments in four areas, one is the reasons why we feel urban wastes are a primary feedstock and one that should gain considerable attention in AB 118 funding; second, I will talk about some of the existing policy and regulatory barriers to the development of these industries in California; and also move on to discuss a bill that our association has introduced to try to resolve some of these issues; and then, finally, I will be talk about industry priorities that we see, kind of our wish list for AB 118 funding.

The feedstock that we are talking about this morning is the 43 million tons that are disposed annually in our landfills in California. This is ironically the same amount of waste that we disposed two decades ago when we first started our recycling programs. There is, I think, programs that have just barely kept us with the increase in our waste loads. Importantly, though, almost 80 percent of this waste stream, these materials, is organic, and consists of biomass and plastic carbonaceous materials that can be utilized as feedstocks for fuel production. Some of the advantages of urban waste as compared to other sources of biomass, I have listed here, namely, we have a readily available year-round supply of these materials, and we do not have to go out of state to get them, they are very cheap feedstocks, in fact, in most cases, you can get people to pay you to take them, which goes a long way towards offsetting facility O&M costs. There are no indirect land use issues and, as Paul Relis mentioned a little earlier this morning, we have already in place an existing infrastructure for both collection and pre-processing of these feedstocks that is basically paid for as a public utility. And importantly, also, these aggregation points at material recovery facilities are also located strategically along the major highway systems of the state. And so this is an ideal situation in which we could contemplate the co-location of bio refineries with these already pre-existing points of co-location. I see my animation has not come through on this, so we will go straight with the slides.

Some of the environmental benefits associated with the utilization of waste feedstocks kind of combine to have a geometric effect. If we can contemplate a scenario where we could co-locate, or at least place in close proximity, bio refineries with the sources of aggregation of the feedstock, then we could eliminate a tremendous amount of energy and emissions associated with the transport of these materials currently to landfill. And, in fact, U.C. Riverside has come up with a way of calculating these benefits in terms of fuel savings and emissions of NO_x and carbon dioxide and particulates. We also have benefits from the avoidance of disposal associated with the emissions from landfills. We have a probably net gain in terms of the emissions from bio refineries, as compared to the emissions from petroleum refineries. We have a tremendous potential for the potential of large volumes of fuels. A conservative estimate has been made that we could probably capture at least 31 million tons of this material and there are a variety of estimates as to how that translates into biogasoline equivalents, but if you figure conservatively 70-85 gallons per ton of feedstock, and Fulcrum is demonstrating up to 120 gallons per ton of feedstock, that is a lot of fuel, a lot of potential to displace petroleum.

And then, finally, we are all familiar with the fantastic numbers that cellulosic ethanol can give us in terms of greenhouse gas reduction when compared with corn ethanol, and certainly with reformulated gasoline.

Well, if we have this potential to produce large amounts of fuel from a cheap feedstock, and we have one of the largest fuel markets in the United States, in the State of California, why aren't we getting a lot of these bio refinery projects coming through the door? The fact of the matter is that California is one of the few states that views the utilization of waste feedstocks by industry as a waste management type of facility; in other words, if you are going to site a bio refinery in California, and you want to use this mixed waste, on the front end, you are going to have to get a solid waste facilities permit. Unfortunately, when the section of the Public Resources Code called AB 939 was written in 1989, it did not anticipate any of these types of technologies, and so consequently none of these so-called conversion technologies such as acid or enzymatic hydrolysis, or pyrolysis, and gasification, are viewed as beneficial uses in the current statute. And so they have no place in the Integrated Waste Management hierarchy, except at the very bottom. Consequently, getting permits for these types of facilities in the state is often very comparable to getting a permit for a solid waste landfill.

And I think it is important for us to emphasize these permitting obstacles, particularly since there are many people in the State Legislature that do not believe they really exist. But if you look at the statute, if you want to use mixed waste feedstocks and you have a technology such as pyrolysis distillation or a biological conversion other than composting, you are falling under the transformation definition in the statute. This requires you to get a full solid waste facilities permit, equivalent to that required of a landfill. There are also many other requirements that take time and money in the permitting process, for example, you are required to be designated in the county's Countywide Siting Element, this is a regional planning document that requires every transformation or disposal facility to have a dot on the map, so if you have a new facility coming in, that plan has to be revised. The revision process itself can take up to a couple of years because you probably have to do CEQA, it has to go out, it has to be approved by a majority of the cities, representing a majority of the population in that county, along with the Board of Supervisors, and then it has to go up to the Waste Board to be approved. So it is a very arduous process. If you go through all of that, any of the waste you divert and turn into fuel products still counts as disposal for the local jurisdictions, so there is very little incentive for cities and counties to want to have these facilities in their jurisdiction. So, optimistically, we are looking at five to eight years of permitting, and that is if there are no challenges, which is unusual. So if we are looking at this program for things we can fund to get fuels into production in three years, you cannot even get a permit in the State of California within that time, let alone produce fuels.

If you have a gasification technology, things are a bit different. In 2002, Byron Sher put a separate definition in for gasification. The good news is that, since you are not disposal or transformation, you are defined separately, you do not have to revise this regional planning document, you just have to be designated in the local one, and you do not count as disposal. But the bad news is that the definition of gasification was accompanied by a set of enormously impossible performance criteria, so that if you want a gasification permit, you cannot use any oxygen in your process. Well, this is something that 99 percent of gasification technologies require, a bit of oxygen. And secondly, and perhaps more importantly, your bio refinery can have zero emissions. To my knowledge, this is the only industry in the State of California that is so restricted in terms of this impossible requirement. Consequently, we do not really have an estimate of what it would take to get permitted in this state because nobody has attempted it. And on top of that, there are a lot of organized citizens groups that are equating thermal technologies with incineration and, so, they make a real nuisance of themselves when it comes to local permitting, thereby increasing the risk further.

There is an end-around to this. If you want to utilize solid waste feedstocks, you can get out from under the solid waste facility permit requirement if you use only separated materials. In other words, homogeneous materials that have been separated either at the source, or at a MRF, and that contain almost nothing that can rot or become a public nuisance, and can contain 10 percent or less of any type of contaminants. This kind of limits you to something like curbside green waste, which is source separated and relatively clean, but the problem is that this places a real limitation on the amount of materials that you can get for feedstock and, of course, this affects your ability to get financed. This is the road that was taken by Bluefire Ethanol, and so they were able to get permitted as an industrial facility, rather than a solid waste facility, but they have a very small volume of feedstock to deal with. It also is a situation which creates direct competition with composters that also like to have access to the same feedstock. And, of course, if this is the only way we can get our facilities sited, we are going to ensure that the bulk of this 41 million tons is still going to be disposed.

So we need some statutory changes in California in order to open up these doors to bio refineries that use municipal waste feedstocks. We are working on the idea of a broad definition of a bio refinery that would include facilities that took both purpose-grown and a variety of waste feedstocks, and exploring the notion that this definition, this set of regulations that would be promulgated from that definition, would be in the Energy Commission's section of the Public Resources Code, rather than the Integrated Waste Management Board's. So we need to clean up the existing definitions in AB 939, make sure that we distinguish incineration from these more advanced thermal technologies, and make these facilities eligible for renewable energy credit and also credit for waste diversion. And we have to do all this without threatening the existing recycling infrastructure.

MR. McKINNEY: You have got about two minutes.

DR. MARTIN: Okay. Well, let me skip through the details on AB 222. What we have done is to try and address all of these issues. Where that bill is now, we will be coming back with a revised definition of bio refinery in January. We have passed through the Assembly, we had thought we were getting through the Senate, as well, and got co-referred to Senate EQ, and that is where the bill sits. So we will be getting a hearing early next year. We have gained support from the Governor's Office and the Energy Commission is very supportive, and we certainly have a broad coalition this time around, and perhaps the planets are going to align and allow us to get these changes.

Our main opposition are the folks that would be competing for this waste stream, largely landfill operators who are also, by the way, investing in these advanced conversion technologies, but are reticent to deploy those in areas where they have existing landfill investments. And environmental groups, ironically, and principally California is against waste, will view these technologies as a threat to the existing infrastructure of recycling, and also there are all kinds of misinformation being put out about the emissions. We have a very comprehensive study just completed in May by U.C. Riverside, which looks at the emissions profiles from third-party data on 100 facilities throughout the world, and these technologies are very very clean. So we will hope, again, that politics does not trump science and that we can prevail.

Given all these constraints, it has been very difficult for facilities to move forward in California. The idea is, of course, in all start-up companies that you want to reduce risk, and certainly the money available at the

Energy Commission through this program is inadequate to provide things like loan guarantees. I think that most companies are going to have to look to the federal government for that type of substantial funding, and it is rumored that there is about $6 billion in the pipeline at U.S. DOE for this type of funding. How much of it will be able to be captured by these types of companies, or by companies siting in our state, remain to be seen.

But in light of those facts, and discussing with our companies what would be most helpful, inevitably, they said permitting is the major obstacle in the state. Most of our technologies are pretty well down the road. We do not feel that research funding is critical, especially at this level. But if this program could provide direct grants on a competitive basis to facilities that can be used for offsetting the costs of permits for construction and for operation, this would be a tremendous help and incentive to companies coming into the state. And what we are looking at is probably an expenditure of $2-3 million just to get through that process.

A second area that perhaps could be looked at by the Energy Commission in terms of assistance would be in siting, and I know I talked to Steve Kaffka about some work that is being done on forestry in terms of identifying Management zones. Something similar can be done in terms of renewable energy, eco-industrial zone designations in urban areas. And setting up those types of zones, either in conjunction with local jurisdictions and their own existing enterprise zones, or looking at GPS information as to where the large MRFs are, and what are the co-location opportunities that can be had. And this would certainly be a value not only for fuels production, but for power production, as well, because the availability of transmission lines to more remote areas for renewable sources of energy is a major barrier for power production, as well. And if these zones could be identified, then we could move on to some very detailed feedstock analyses, which would give tonnages and types of materials available to companies interested in siting in that area, and also perhaps the development of programming EIRs for this zone, so that when a company stepped in, a lot of the groundwork has already been done in terms of CEQA compliance.

MR. McKINNEY: I am going to ask you to move to completion, please.

DR. MARTIN: I am done, thank you. And this is the website of our association, if you are interested in learning more about us or about the legislation that we have proposed. Thank you.

MR. McKINNEY: All right, thank you very much. Our next speaker is going to be Ted Kniesche with Fulcrum

Bioenergy.

MR. KNIESCHE: Good afternoon. I am Ted Kniesche. I am Vice President of Business Development at Fulcrum Bioenergy. We are based in Pleasanton, California. And we have been around since the beginning of 2007 and we are principally a waste fuels project development company that has been advancing technology for the purpose of converting biomass, principally waste streams, to biofuels. Our business model is based on securing long-term control of feedstock, which we have done, and I will get to in a second, in a number of places around the country, as well as in California. We have a gasification technology that can convert this biomass material to ethanol, and it is a truly low carbon fuel pathway, very consistent with regulations that have been recently passed like the California Low Carbon Fuel Standard, as well as consistent with the EPA RFS2 Regs. The greenhouse gas reduction potential is significant, especially since you are averting the production of methane gas from landfills, while also producing a low carbon fuel.

Our first project is just outside of Reno, Nevada, that we have been developing for about a year and a half now. The project is permitted and ready to go into construction, which we expect either later this year, or early next year. That facility is about 10.5 million gallons of ethanol per year. And we are excited about the proximity to the California market because we think we can take advantage of the California Low Carbon Fuel Standard.

Let me just kind of flip through this and I will get to some of the AB 118 specific matters. These are some projects that we have secured around the country through feedstock contracts with a couple different -- with partners. And you can see that there are a lot of wastes to be had in the country, and I will say that there is a lot of discussion about potentially competing policy objectives between various waste management practices, and we feel that this industry, waste fuels industry, is really sort of the last opt before the landfill, and it is very compatible with robust recycling markets like you have here in California, in the Northeast. Waste is really a volume game if you think about it; even though people talk about high percentages like 60-70 percent recycling, you think, well, there is not much left over, well, there are, there are still millions of tons going to a landfill, even with very robust recycling rates. So we advocate strong recycling programs, in fact, it reduces our handling costs to handle that material, but we also advocate making better use of the material that is heading to the landfill that can really achieve energy security and climate change goals.

I will just run through the technology a little bit. We can convert -- we essentially have a two-stage technology, let me just get to here and described it a little bit better. You see the first two blue boxes on the left, we have a two-stage gasification process that essentially converts about 80 percent of the material in that first blue box to partial oxidation gasifier. And then that syngas, it is called synthesis gas, it is pulled off of that gasifier and goes through a very robust scrubbing system. The remaining material has a lot of carbonaceous material in it, but it does not react as quickly or as easily, and that material goes through a plasma reactor, a much smaller unit, and a little bit different than maybe some of the plasma systems folks might be familiar with, especially certainly here in Sacramento. We do not really put all the material through the plasma unit. Plasma can be expensive to run, it can have a high parasitic load, so you want to put as little material through that as possible, which is why we have set up the partial ox gasifier as sort of the workhorse engine. And what is has done is it has really reduced our opex O&M costs and made this facility much more efficient from an economic standpoint. The gas is then scrubbed to a real significant degree. There is a technical necessity, really, of doing this, not just an environmental one. The alcohol synthesis unit on the back uses what it called a catalyst and the gas passes over in the catalyst and, for the catalyst to operate appropriately, it needs to be a very clean gas stream. So the technology is such that it requires a very robust cleaning system. And then, like I said, we can get ethanol out of the back using, based on the prepared feedstock coming in, we can get up to about 120 gallons per ton, per prepared ton, of feedstock, which I think is sort of the upper limit of what has been announced in the industry, and we actually put out a press release just recently talking about some of the recent technical achievements we have had, so we are pretty excited about that technology.

Here is a demonstration plant that has demonstrated the gasification unit on the left, that is up in Washington, and on the right-hand side is our, really, a system that we designed and licensed. We licensed the catalyst, but we really did all the process engineering and design. Like I said before, we are a project development company. We are relatively technology agnostic, but this is new technology in this industry, and so to advance the projects and all those dots on the map, we got into technology probably a little bit more than we otherwise would in the future, but that is sort of the nature of the business.

I think, you know, a lot of people talk about the potential. There is certainly a lot of potential within regulations such as the RFS, where there is 36 billion gallons mandated, the vast majority of which need to come from non-commercial technologies, as of yet. There is also real exciting regulations like the Low Carbon Fuel Standard, well, there is a lot of debate over ILVC, indirect land use there. I think the basic premise of that regulation, I think a lot of people like, which is not really picking winners, not really picking feedstocks technologies, really trying to let the energy -- the broader energy fuels industry -- figure out how to achieve what is really a greenhouse gas paradigm and how to get there. I think there is a number of options in getting there through electric cars, through efficiency at refineries, and also really -- we think biofuels will be one of the biggest drivers. So we like that regulation, we supported it, we understand some of the issues and the growing pains it will have in establishing these indirect land use targets and improving that science, but I think fundamentally we like it certainly better than the RFS, which is very -- it just feels very lobbied and very selective, I will say. So we think that, at least California is kind of a more business-friendly direction from our point of view, and it also helps that we do not have any indirect land use issues.

That sort of leads to the next piece of this, the environmental benefits. We see a greater than 75 percent lifecycle -- complete lifecycle greenhouse gas reduction from our technology. You know, it could be a little bit better, a little bit worse, depending on where you are at, and a lot of different factors that go into that number. But based on about a year's worth of analysis and work we have done, we are excited with at least that target, and we think it can make a real impact on climate change. And, you know, I think a lot of people have talked about some of these sort of dual goals of energy security and climate change, and we feel that wasted fuels shows that they are not really mutually exclusive, that you can have high impact feedstocks, high volume feedstocks that produce a lot of gallons, whether it is helping California achieve their E10 and E20 mandates just for waste, but we think there is a real big potential in the billions of gallons throughout the country with this fuel pathway. And, by the way, it helps to solve the climate change problem. So I think that is really the direction we see the country going, trying to get large volumes of fuels that also help mitigate climate change.

Here is just a little bit about our first plant. Like I said, it is about 20 miles east of Reno in a large industrial park that is out there. It is about $120 million, so these are capital intensive projects, but as I think we said in the press release, the O&M costs, we believe, will come in fairly well under a dollar a gallon, so you see projects that are pretty well financeable from that perspective, you know, even though they are a little bit higher capex, the opex is lower. So we like that business model. And we also have 20-year contracted fixed price feedstock for that facility and all of our other facilities, so we have been able to take all the price volatility out of the inputs of feedstock.

So just a couple things, just to address the AB -- time? I am sorry.

MR. McKINNEY: Let's see, you have got five minutes.

MR. KNIESCHE: Okay, that is good. Let me just run through a couple of things, and I think, you know, Kate touched on some of the policy challenges that exist in California, and certainly permitting is one of them. I think it remains to be seen how long it will really take to permit something in California, no one has really tried, as she said. I think we need to be able to get going on the project and actually permit it to see how willing the Air Board is going to be in working with us, and try to achieve objectives like the Low Carbon Fuel Standard. So I think we are relatively optimistic that, based on California standards, we can get something permitted. I mean, it is not going to be a 120-day air permit like you get in Nevada, but we did not put it in Nevada to skirt permitting, we put it in Nevada to get going quickly, and these facilities are designed to be permittable anywhere in the country. So we are eager to get into California and we do like, as I said, some of the regulations that exist, that we feel are real strong incentives like the Low Carbon Fuel Standard. We feel that, if you can get a fuel into the market that has a real climate change impact on greenhouse gas reductions, that you will be able to realize a pretty strong premium for fuel. The RFS, as I said, has its challenges, but at least there is a blending mandate there that helps drive the market. And if climate change ever goes anywhere in Washington, I think the price of carbon will help this industry, as well.

The technologies are rapidly advancing. There are a lot of technologies. We believe ours is commercially ready. There are a lot of other technologies -- you talk to any other producer -- there are nine, 10 different ways to convert biomass to something in an economic way. I think, talking about AB 118 money, and this forum really best uses the money that is available, you know, I think the real downside to development these days, that is different than 18 months ago, are the financial markets. It is no secret that the economy has taken a big hit, the recession has been bad for a lot of people, and I think it has been especially bad for the biofuel new technology, new energy industry, and I think there will be a loud effect as the economy recovers. If you think about it, there is a lot of investments that are now all of a sudden much cheaper than they were 18 months ago, and whatever capital is available is probably going to go into these low risk investments before they ever come in to what continues to be a risk capital. So I think the conversation about how best to use the AB 118 money, this $100 million, is appropriate because, much like we are trying to get out of DOE, and a lot of companies are trying to get loan guarantees and grants out of DOE through the recovery act and other programs, it is important that the government provide some sort of stimulant to this industry to really encourage private capital coming in. It is unlikely that they will come in on their own and do equity deals the way that we may have seen 18 months ago. By the long side, programs, whether they are grant programs or loan guarantees, we think that you could attract private capital, which I think will help advance all these other objectives, R&D, fuel infrastructure, all these other things.

So I think from our perspective, there is a lot of opportunity to advance what we feel are commercially ready technologies, but we need to help capital markets work a little bit more efficiently. And this may be a little different from what others have said here, but we would be much bigger fans of a large loan guarantee program that will use the lion's share of the money in the $100 million funding for a large loan guarantee program. We feel you can get maximum leverage, I think the DOE and the USDA get anywhere from 10 to 15 X coverage on the actual funding they have available, so you are looking at a potentially $1 billion plus loan guarantee program for really what are commercially ready projects. These are big job creators, you can really help pull the California economy back on the right track through energy projects that are produced in-State. Again, as Kay touched on, we need to work on some of the permitting issues for the different technologies, but I think, if you really want to get your biggest bang for the buck, from our perspective, for a $120 million project, an $800,000 grant is not going to get us there. We need access to larger sources of capital, it does not have to be California Treasury capital, it can be backed by this loan guarantee program, and you can then access it through the private debt markets and raise private equity. So I think that would be our biggest -- highest on our wish list. And I think it is important that a program like this does not try to specify certain field pathways, or certain technologies, or certain feedstocks. I think it is more important to look at the big picture paradigms of California produced energy or fuels, and greenhouse gas reductions, and really let the Applicants show why they can meet those objectives, why they can create jobs in California, and stimulate private investment to win that program. But we feel pretty strongly, I think, that turning $100 million into potentially a billion dollar program will do a lot more than a series of grants and other mechanisms sprinkled throughout the industry. And that just may be more of where we are sitting as far as eager to get commercial projects on the ground, but I think it is important.

MR. McKINNEY: Okay, thanks very much, Ted. And thanks especially for the specific suggestions and recommendations on the funding mechanisms.

MR. KNIESCHE: Sure, thanks.

MR. McKINNEY: Our next speaker is Dr. Steve Kaffka, University of California at Davis. Welcome, Steve.

DR. KAFFKA: Thank you. I have a few things I want to start off with as comments. I was pleased to hear Dr. -- I think Mayweather -- from U.C. San Diego this morning talk about the need to consider all types of feedstocks and all sources of energy as we transform our economy, and I completely agree with that, and I think that is really where agricultural feedstocks come in, as not necessarily the main source, or even necessarily the majority source of feedstocks for various energy transformation processes, but as contributors. The question is, which ones will be the best ones, and where and how should they be grown? And, really, there is no current best or concrete answer to those questions. I think it is also important to try to get past some of the things that have been, I think, stifled a bit, and perhaps might stifle development in California. The notion that we have a food versus fuel conundrum, I think it is much more useful to think about crops, all crops, as part of an integrated farming system that compliment each other, that are a part of a farm business management plan, that optimizes uses across a series of years and fields, rather than as a food crop versus a fuel crop. And I think it is not very useful to think about first generation and second generation feedstocks. I think that is an arbitrary and linguistic distinction because the materials that come from plants, be they starches or sugars or cellulose, in a sense have certain fungability and can be used in a complimentary manner.

So I have got a few topics. We do not have much time. I am going to skip some of the slides I calculated originally in planning this, Jim, and I am going to try to do it in 12, so I will skip a few things I have here.

MR. McKINNEY: We can cut the difference there, Steve.

MR. KAFFKA: Okay. I just wanted to kind of highlight just a few crops that might be possible feedstocks, that have not been well developed or analyzed yet in California, except for the sugar beets there, and maybe talk a little bit about economic and yield thresholds and how we might determine those.

Just to start off, the California Biomass Collaborative is really a service group. It is funded by the PIER Program. And if I were to look at the AB 118 program, basically we would be looking at it to enhance our funding, to do the services that we wished to provide, and the assessments and analyses, more thoroughly than we can under current contract limitations. So particularly, what I mentioned yesterday, the idea of developing a more capable and more complete integrative assessment capacity would be what I would look to AB 118 for.

So to just talk a little bit about Canola, this is dry farming -- we have dry farming in California and Canola might be grown as a part of alternate fallas [phonetic] systems. I am just going to go fairly quickly. We would grow spring types here. We have not developed the variety. I will mention Australia here off and on. Australians have more than a generation of growing Canola under dry farming conditions at the same Mediterranean climate and latitudes, still, on their heads, in the Southern Hemisphere, as we do, so we can learn from them. Their yields are somewhere between 500 and 3,000 pounds an acre. The older work in California was more or less in the same framework, so it seems to me that the Australian work is also of some value and it helps us get into production and management conditions without as much investment.

This is some work from one of our bioenergy work group common proposals here. There are three things on there. What you see are a variety trial of a bunch of different canola varieties, and the range is there from about 1,700 pounds per acre to 2,500 or 2,600 pounds per acre at 90 pounds of nitrogen fertilizer. On the bottom left, you have a nitrogen response curve. In fact, it is linear. We could probably put more fertilizer on it and gotten higher yields, in this case almost two tons. And you can see that there is on the bottom right an irrigation trial where a single irrigation in the spring increased yields by an average of 800 pounds. This is a winter crop, grown in the winter primarily in rainfall, but sometimes supplemental irrigation is needed. This is just put up here to give you an idea of the kind of work that goes into Best Management Practice development. If we are going to also measure environmental effects, that experimentation gets even more expensive and takes more man hours and more instrumentation. But to do an integrative assessment program, you need to do additional measurements than the simple traditional agronomic ones.

This is a crop that some people are mentioning now as being of interest. This is camelina, which is also in the same family as canola. This was planted in December, late December. We only put 30 pounds of nitrogen on it, there was no irrigation. This is it at harvest. It did not yield very well, the highest yield was around 800 pounds, but we are going to continue to do some work on it. This might have a role and niche in orchards, or in vineyards, possibly in certain dry farming conditions, and it produces oil that can be made into biodiesel.

Just a little bit about sweet sorghum. It was mentioned yesterday and I think it is a likely feedstock. We did a trial, the first one that I have done personally, starting last June in Imperial Valley, about 150 pounds. There was some pesticide applications. All of these things have to be accounted for as we develop Best Management Practices. We put about 40 inches of water on this trial. This is what a harvested plot looked like, we did it by hand, so the yields are a little bit high because the trash is included. But here you can see four varieties that were in the trial and the relative total fresh weight, and then on the right, you can see both the sugar concentration, which is the highest and the lowest yielding crop, and the biomass yield, and then the concentration of sugar X biomass for a total of sugar yield.

MR. McKINNEY: And then, Steve, if I can ask here, so those are four different varieties all under the same cultivation conditions?

DR. KAFFKA: Yeah, it is in the same trial, same treatment. And basically what you see, it is an interesting crop, but there is a lot of development yet to do. These all have relatively different maturity characteristics, and I will -- so, for instance, the one that is the most mature on the left, the sugar drip, is also the lowest yielding, but it has the highest sugar concentration. But the sugar X biomass calculation means that the highest total energy and sugar yield is from the one on the right, or the M-81. So there you see the higher heating value of the bagasse residue and, again, this would be possibly converted into electricity, or into numbers of byproducts that were mentioned yesterday, and you will hear about again later today. So here is sugar drip at harvest, the seed was largely mature, here you see the Dale [phonetic] variety, the seed was approximately the soft dose stage, here is the 7660, the seed has just emerged, and then the most productive one was the slowest maturity, least photosensitive one, which is M-81. All of these factors have to be accounted for if you are going to create a production system that provides feedstock on a daily basis over and extended period of time.

This is a neighboring sweet corn crop that was not sprayed for flea beetles, so pest management is going to be an issue. It does not look very good. This is sugar beets. I have to put it in this crop that I have worked on. We have seen remarkable yield increases in the past decade or more, sugar beets in the Imperial Valley, and the Central Valley of California, as well, basically we are seeing improvements in agronomic production characteristics and, if I were also to estimate a guess, I would say that increasing atmospheric CO_2 has contributed to increasing productivity over time. We have the world's highest yields of sugar beets in California, and if there is a single crop, annual crop that is going to be used as an energy source to capture the most energy possible on an annual crop, not a perennial and annual, this is a very good candidate. And you can do everything with it. You can gasify it, you can ferment it, you can make ethanol out of it, you can get secondary products out of the protein, and all kinds of things. And it has very high dry matter yields. This is down in the Imperial Valley at an optimum fertilizer rate. You are looking at close to 30 tons of dry matter in a season by the end of the season, just in the roots alone, total dry matter is about 30 plus tons of dry matter and that is a remarkable level for an annual crop anywhere in the world. But the interesting thing is that the fertilizer needs of this crop are better understood now than they were in the past, and we are getting roughly three times the yield for the same nitrogen fertilizer level that was put in, in the past. And this is characteristic of what we are going to have to do with crops, in general. We have to have very high levels of efficiency, otherwise it is not worth -- you want to get the most energy with the least input.

Just mentioned yesterday, and I will go on today to talk a little bit about where and how much crop might be grown in California, we are trying to assess that. This is a combined project with a number of investigators, including farm advisors for around the state of California, and it is a bioenergy work group, and it is partly funded by Energy Commission funds.

And I had this slide yesterday, and I want to just quickly point out again that production conditions vary substantially from place to place in California, even though people think of it as a uniform setting, it hardly is. So the optimum biomass production system is going to be local. So how do we get an idea of where and how much biomass will be grown? So we want to try to do this by creating economic optimization models that simulate individual farms or regional farm conditions. We can estimate the potential yields of these crops and we can estimate the effects of different kinds of policy incentives on which crops will be produced, and where, and when we have the robust models. And we want to have regionally specific ones for the Sacramento Valley, the Delta Region, the San Joaquin Valley, the Imperial Valley, and the Intermountain Regions.

So I am going to skip a few of these things because it is not too important. So one of the steps to try to get data on how farms vary is to interview growers, and so, well, we are up to about 17 now, they are not all listed on this slide here that indicates major soil groups in California. You ask farmers about their costs and returns. So what you can see here is just some of the farmers from the San Joaquin Valley, just look at the first line for alfalfa hay, and you can see how costs vary. And the number in the parenthesis is the percentage of those costs due to water, and you can see how that varies. So, in fact, if you make one calculation for the State of California about how much corn grain, or corn residue, you would get, and where you would get it, you could get quite far off. So we studied these individual farms and looked at various crop prices and yields, and so this is Farm 4, and the question was, is he going to grow canola. In his system, there is no price at which canola makes sense compared to some of the other crops that he grows. But, sweet sorghum makes sense, it is somewhere around $26.00 to $28.00 a ton, and what does it displace? Well, it starts to displace alfalfa hay, and probably because alfalfa hay costs him a lot of water in that same circumstance, so sweet sorghum is a water trade-off. This is Farmer 4, this is price, this is yield, so he might produce -- at the price we simulated, he was not going to produce canola, but with canola, you could get $22.00 to $24.00 per hundred pounds -- no, it would be $20.00, that is not quite right -- yes, it is right -- for 100 pounds, so that is over $400.00 a ton if he would grow canola. That is pretty much a high price and not a useful biofuel price.

So Farmer 5 has a very different scenario; in fact, canola does come into his farming operation and starts to displace, in his case, pima cotton. So on this goes. I will not spend too much time at it, but there -- I showed this yesterday -- and these prices are not fixed in stone, but they are rough initial estimates of the trigger price for various farmers at which canola would come in, or sweet sorghum might be produced on their farm.

So it turns out that, if you consider the broader economic questions associated with biomass, like for instance sweet sorghum, you are not just producing a sugar crop, you are also producing a biomass crop. And if you can think of all the price, all the crops and prices in the terms that farmers can get, for instance, if they can get a share in the cost of production on the sale of ethanol, if they can get a share in the cost of the production and sale of electricity, if they can get a share in the cost of production of the biomass secondary products, perhaps including growing algae on the leftover residues, then, on a per acre basis -- on a per acre foot of water basis -- these crops look very competitive. The trick is to create a business model that allows that to occur and to see if, in fact, you can produce these things at the right costs. The other thing is that some growers are happy to contract over time for a known commodity at a known price, so they are willing to sacrifice optimum, or maximum income on a per acre basis for security, and those things, in fact, make it feasible, I think, for biomass crops to come into production.

So I went a little over a bit, and I went a little fast, but this just gives you kind of a flavor of how this work is going and there are still lots of unknown questions about what the ultimate scale, and role, or contribution of crops might be to California's fuel and energy picture, but I think there are opportunities for it, especially if we keep an open mind about whether these crops qualify or not. Thank you.

MR. McKINNEY: And, Steve, I had one follow-up question for you. It is kind of my thinking, and I think some of this was confirmed by speakers like Brian Pellens and Dave Rubenstein yesterday, the role of bio refineries in California, you know, as setting up long-term contracts with growers, is that a big factor in how growers throughout the state decide what cropping systems to use, if I can use your words?

DR. KAFFKA: Well, we have not done too much of this yet, we are on the verge of it, at least we hope so. And it takes quite a bit of negotiation with the growers as part of the business development challenge, I think, for a biofuel company that wants to use that feedstock, to secure commitment over time. Growers have lots of crop options. But they also have to then manage a whole lot of different farming operations, and they have to worry about prices over a larger spectrum or range of commodities. So there is, at least among some growers, a willingness to commit a portion of their ranch or their farm to kind of an ongoing contract basis. It is done effectively already for tomatoes. People buy tomato harvests because once you have bought a tomato harvest for a quarter million dollars, you are into tomatoes. So basically it is not so far or so alien a notion, in my opinion.

MR. McKINNEY: Well, thank you very much. Our next speaker is -- I hope I do justice to her name -- Ms. Rosidah Radzian with the American Palm Oil Council. And I especially want to thank her and Kassim for arranging her trip from Washington, D.C. to present to us today.

MS. RADZIAN: Hi, my name is Rosidah Radzian and I am from Malaysia. And first of all, I would like to thank the Commission for giving us the opportunity to share the latest development in the palm oil industry, and how palm oil can play some role in the biodiesel industry in California.

I am coming from slightly a different perspective because I am going to talk about feedstocks which are coming from outside California. And during this brief presentation, I will have a snapshot of global palm oil industry and what we are inputting to basically ensure the quality as a classification of palm oil, as well as focus on the environmental stewardship program that we have put in place in Malaysia, and I will also touch very slightly on the essence of palm oil, as well as what is the future for palm oil in the biofuel industry here in California, as well as in the U.S.

Okay, if you look at this chart, this is the global production and export of palm oil at the global level, and you can see here the three countries in Southeast Asia which are Indonesia, Malaysia, and Thailand, are the major producer of palm oil. And we are also the major exporter of palm oil in the world, and we have contributed quite a high percentage for the total oil at the global level. And this palm production, mainly from Indonesia and Malaysia, they are key contributors to the oil supply in the world and, as you can see from here, Indonesia now is the biggest producer and the forecast up to 2015 will be about 20 million tons of crude palm oil, which can come into the world trade, and as well from Malaysia, our production is slightly lower. This is mainly because our land is rather limited compared to Indonesia and, by 2015, we only forecasted about 21.5 million tons of production for crude palm oil. And if we compare palm oil with other vegetable oil, palm oil is one of the most productive and cost-effective feedstocks because it has a very high yield per hectare of land.

In Malaysia, we have put together quality and specification bodies to make sure that the quality of palm oil that we produce and export to the world is meeting all the quality standards required by our customer. And PORAM standard trading specifications is one of the common specs that we use to trade palm oil at the global level, and this applies to refined, deodorized, and bleached palm oil, and also refined in bleached palm oil and palm [inaudible]. And within program specifications, we have a contract that is very well established to ensure that the palm oil which is traded at the global level meets all the requirements, and we also have an arbitration procedure to make sure that, if there is any dispute within the buyers and sellers, we can speculate properly. And crude palm oil is also traded at the global level, but the specification that we are currently using is mostly for the local use, or local refiners. But if any of the buyers from overseas are interested to buy their crude palm oil, they can negotiate a specification that can meet their requirement to either produce biodiesel or even for food side.

And in Malaysia, we have a very strong government policy to support industry, and Malaysian Palm Oil Board is one of the government agencies which is entrusted to ensure that all the activities within the industry are done in an orderly manner. And within the Palm Oil Board, we have a division solely focused on licensing and enforcement to make sure that all the activities within industries are licensed, so for anybody who wants to even sell the seeds of palm oil, you must acquire a license from the Malaysian Palm Oil Board. That is how strict our regulation is to ensure that the industry is well managed and well taken care of within our plantation and throughout the supply chain.

And so far, we have not received any complaint from the bio from the U.S. and you can see from here that palm oil usage in the U.S. has grown quite steadily from the year 2000 until the last year, and last year we have reached about one million tons of palm oil being exported to the U.S. And at this time, most of the palm oil we exported to the U.S. are used in food side. And last year, we have exported about 73,000 tons of D100 to the U.S. for the biofuel, and that is still a very small volume.

Yesterday, Jim mentioned about the branch of Commission on the sustainable developments. I am not going to touch on that, but I will focus in Malaysia, when we developed the palm industry, it is to take the holistic approach because, as a developing country, we have to make sure that our social development, our economy grows, as well as our natural resources are well balanced. We have to make sure that we find a balance between industry and the people in the country is well taken care of so that we have a very safe and secure social development in the country and we do not have any riot going on then. And palm oil has contributed a lot in that matter.

But my discussion today will focus more on the consideration and the management of environment and how we have done that through our Environmental Stewardship Program. This is very important for us because we have to address all the concerns and misconceptions about the environmental issue related to the palm oil development in Malaysia, as well as in Southeast Asia, but my focus today is more on Malaysia. And we have to demonstrate the positive sustainability element currently in place in Malaysia, and how we want to bridge the divide between the NGOs and the palm oil communities, because we do have a lot of allocation from the NGOs with regards to the environmental management.

And in Malaysia, we have a very strong regulatory framework related to environment, to make sure that all the activities that we carry out within the industry is environmentally friendly. And if you look at the environmental related matters, we have a few regulatory which are in place since 1960s when we started to do the commercial palm oil, and we have the wildlife regulatory matters, we look at the land areas, we have the land policies, and also the pesticide use to make sure that we do not use a lot of chemicals within the plantations. This is one of the important factors in reducing the GHG and also looking into the environmental health of our plantation. And within the plantation, we have put a lot of activities, this among the current activity that we have put in place to ensure that all the activities are done in a sustainable manner. The implementation of code of practice throughout the oil palm supply chain is one of the examples. This is one of the activities that we put through the nursery, plantation milling, refineries to the back installation and for the industry and plantation, we practice good agricultural practice. This is the world standard that we comply to. And zero burning policy is one of the policies that we put in place to make sure that no one within a plantation burn the oil plantation or, when they clear a new area, they use the burn as one of the -- burning is one of the practices. So if anyone were found to do so, they would be fined. And integrated best management is one of the activities that we have put in place to reduce the chemical use, and we used burn-out to control the pests, as well as we use the Banyan plants and parasite to control the worm and other pests within the plantation. We also use the satellite monitoring system to control the disease to make sure it is very focused and we can just treat that area very efficiently. And in addition to that, we have also established the Malaysian Palm Oil Wildlife Conservation Fund, which amounts to about $5.6 USD. This is for research and development to focus on conservation. We have the program established with the expert within the government academy and also the NGOs in Malaysia, as well as at the international level.

And one of the successes in sustainable development in the oil palm industry is the establishment of the RSPO. And this has been going on very well in Malaysia, and we have now about more than 300 members who joined this RSPO, and it covers a wide range of participants from banking, from manufacturing and retailers, planters, and others.

And the new initiative that we have put in place to reduce the environmental impact is to carry out a lifecycle analysis studied throughout the oil palm supply chain, and at this stage, we have commissioned a tech basili which is the lifecycle associate to work with us to establish the palm by this pathway. And we also have established the Tropical Peat Institute to look into the peat land development for palm oil, and we have had a good collaboration with the University in Netherlands to look at biodiversity within the peat land, as well as within the oil palm plantation. In addition to that, we also have introduced the roadmap for the oil palm industry to make sure that we are competitive in terms of production and course, as well as to make sure that the palm oil industry goes well. And we do look for -- we have a future collaboration with a U.S. institution in this area to make sure that we comply with the requirement within California, as well as the U.S.

And this is one of the examples which is happening within the plantation in Malaysia, which is the methane capture, and this is converting the palm oil effluents into biogas, and this methane is then used to generate electricity, which is then channeled back into the mills or the refineries; and in the big plantation, this electricity which is generated is then sent to the people within the plantation, as well as sent to the national grid, and during this process, we have managed to mitigate the CH4 emission by about 80 percent, which is a very good achievement within the oil palm plantation.

Part of our focus within MPOBS, as well as in the industry is to increase our research in the biomass utilization, as well as the oil yield for the palm oil. And this example is one of the newer variety that we have developed with a very high yield oil, compared to the normal varieties that we are using a few years ago. And nationally, our goal is to achieve about 8.8 tons of oil per hectare, per year. And if you can see here, our current national average is about 4 tons per hectare per year. And the best managed plantation can now deliver 7-8 tons per hectare per year and the new variety, something like this, can produce about 10 tons of oil per hectare per year. We are still very far away from the biodiesel potential of palm oil, and if we can achieve that, I can assure you, the supply of palm oil will be good.

And for palm oil, as a feedstock for biodiesel, we have carried out the lifecycle analysis, and this is the boundary system that we use to look at the GHG emissions throughout the supply chain for biodiesel. And we are also working with the lifecycle associate to come up with the palm based biodiesel pathway. And the initial numbers that we have gathered so far look very promising, and if you look at the GHG emissions without the biogas capture, which I showed you just now, the methane capture, the GHG emission savings is about 51 percent. And if we have the biogas capture, this is even better, it is about 66 percent GHG savings. And the biodiesel that we have developed in Malaysia meets this specification ASTM D6L51 and also the European specification EN 14214.

And for palm oil, for all of the development work and the environmental stewardship program that we have put in place, we feel it has a very great potential to be one of the key contributors as a feedstock to support the Low Carbon Fuel Standard in California. Why? Because the environmental stewardship program and all the sustainability activities that we put in place do support the sustainability goal within the AB 118. And if the new facilities that are going to be built in California with the funds from AB 118 can handle a multi-feedstock, palm oil can play a very good role in supplying the feedstock for the biodiesel industry in California. It is very cost-effective and we do encourage blending with the local feedstocks. So if we have the facilities that can handle multi-feedstock, palm oil can do very well blending with the local oils. And with the establishment of association and government support within Malaysia, the supply security and infrastructure is very well established for palm oil to be traded at the global level, and then it is very easily traceable and the supply is in abundance. And the quality of biodiesel that we can produce from palm meet the ASTM standard, as well as the 14214. And the latest studies that we have done for the LCA indicates that palm oil based biodiesel has a much lower GHG and the data that we have now is currently being verified by the [inaudible] in Europe, and we feel that palm oil can contribute a lot to California in meeting the Low Carbon Fuel Standard.

And before I end my presentation, I just would like to mention that we have a series of workshops to discuss about the sustainable development of palm oil, one is happening next one in New Orleans on the 5th and 6th of October, and then we have another one in Washington, D.C., this is more like a roundtable discussion on the strategic development of sustainable palm oil, which will happen on the 8th of October, and we have two more conferences in Malaysia which are also looking at the conservation effort and sustainable development within the industry, which will happen around 15th or 16th of October next month. So with that, I would like to finish my presentation and, if you have any questions, please feel free to contact me or my colleagues, Kassim at American Palm Oil. Thank you very much.

MR. McKINNEY: Thank you very much, Ms. Radzian. Very interesting presentation. I think in the interest of time and efficiency, and perhaps our stomachs, that we will break for lunch, come back at 1:30, and then perhaps we can have kind of a broader group discussion at the end of the second biofuel and feedstock panel.

So with that, why don't we break for lunch, come back at 1:30. The Farmer's Market is up and running today, just kitty corner here, there are some good food stands and, again, there are local restaurants one to two blocks up on "O" and "P" Streets.

[Off the record at 12:40 p.m.]

[Back on the record at 1:37 p.m.]

MR. McKINNEY: I want to say to the people presenting this afternoon, do not be mislead by the number of vacant chairs here, we have a lot of people listening in, and, really, the intent is to build a record, you know, not an evidentiary record, but a public record upon which we can make recommendations from staff on the Investment Plan and how that should be structured and prioritized for this next year. So we have had really great participation from the panels, and I think you guys will provide the same. So we are listening and attentive, and all of this goes into the written public record, and it is valuable information.

So this next panel continues our discussion on feedstocks, and the focus with this panel is going to be on California production, and especially with the grower community in California. We have Carson Kalin from Kalin Farms, Clark Ornbaun from Ornbaun Farms, Phil Treanor is going to speak for Dino Lekos with TSL Seeds, and then Thor Bailey will also talk about farming systems. So this will be really the first time we have heard from a collection of growers in California, which I am really looking forward to. And to begin the panel, we have David Rubenstein again with California Ethanol and Power. So, David?

MR. RUBENSTEIN: All right. Well, thanks for having me again, I appreciate it. On yesterday's panel, I started off and I kind of addressed the five general questions that staff had asked before coming to these meetings. What I would like to do today is to try to convey some of the terrific things that we think California Ethanol and Power, and projects like us, can bring to the region, the state, and even on the federal level.

What we intend to do is develop, build, own and operate sugarcane to energy facilities here in California. Those facilities would be using sugarcane as grown here in California by the citizens of the state. The sugarcane ethanol will produce a significantly lower carbon intensity than gasoline, corn ethanol, or even imported Brazilian ethanol. We recently had Lifecycle Associates, who has been mentioned numerous times, to take a look at our project and give us an idea what the carbon intensity would be for the fuel and we came up with about 5 grams of CO_2 and even if you added in the direct land use, we are still at about 20 which, based upon the most recent Brazilian numbers were about one-third the amount of carbon than they have for the imported Brazilian ethanol.

Yesterday, Steve Kaffka also showed a slide of the Brazilians having a party because they were so excited about importing Brazilian ethanol, and I strongly suggested that we should have that party down in Imperial Valley once we get this plant going.

I apologize, there was supposed to be a slide on here that is missing. I will have a copy for you. I gave one to staff and I would be happy to lose some more out there. It is an information sheet that kind of talks about some of the opportunity it brings to the valley. It talks about the agricultural side, as well as the economic side, and I will get to the feedstock in a second, but let me talk about some of the economic and financial things that this project could bring. Each facility would produce 49.9 Megawatts of green power, 36 would be supplied back to the Grid, which is enough energy to support 35,000 homes and, based upon your economic models, you know, it is a wide range, but these are pretty close numbers, I think, to be using just as a point of reference. We would create nearly 900,000 million cubic feet of biogas, which is enough clean gas to heat approximately 10,000 homes. We would produce 66 million gallons of low carbon fuel, and that reduces the need to import 1.5 million barrels of oil. So if you do a quick calculation, say it is $70.00 a barrel, heck, now we are keeping $100 million here in the state that is not being shipped overseas. Talk about economic activity within the state. Thousands of construction jobs would be provided for the first plant and would continue for numerous years if we end up building four or five plants that we think we could get underway out there. Each facility would create about 350 full-time jobs, that is agricultural, plant, management, and transportation jobs; multiply that by the five plants that we are thinking about doing and you are talking about 1,700 plus jobs. If you add the indirect jobs that go along with that, we are talking about the creation of some 5,000 jobs within the state and the region.

Our project is intended to be down in the Imperial and Palo Verdes areas. Imperial Valley currently has an unemployment rate of about 25 percent, probably the highest in the country. This project would benefit the local region and state economies, as well as the federal. The project would help get folks off the unemployment rolls, which begins a cycle that they begin to pay taxes, and they also become consumers of goods and services. With 350 employees, we are talking about millions of dollars of annual state income tax, sales tax, and other taxes that will go with it. Right off the bat, each facility will be needing to buy agricultural and plant and transportation equipment to the tune of about $200 million, sales tax at 8 percent, just as a round number, you are talking about $16 million of sales tax that we drive into that economy almost right off the bat.

One thing we hope the CEC will do is something that DOE typically has not done, is to fund projects based upon performance, rather than a specific technology classification. As an example, the DOE has been granting millions of dollars to firms that say they are cellulosic. Our ask would be that the CEC judges projects based upon their ability to lower greenhouse gas emissions, regardless of the technology, and to quickly distribute funds from AB 118 that can demonstrate that they are capable of delivering on a commercial quantity, sustainable, reliable, and economically produced low carbon energy here in the State of California.

In our case, growing the tens of thousands of acres of sugarcane, let me get that slide for you, tens of thousands of acres of sugarcane required to support the plant is an extremely large, complex, and costly portion of our development. We have calculated in our complex and very detailed agricultural models how many acres are needed, when the plant begins operation, as well as the huge ramp-up of the growing of the sugarcane from now until then. Currently, we have approximately 500 acres growing, which is up from about 100 acres last year, and you can see by the slide is how we need to ramp it up over the next few years in order to get to the 67,000 acres required to support the plant. So it is pretty aggressive, it is a lot of work, and the modeling is very detailed just to -- you plant a certain time of the year and it grows faster or slower, so it is very detailed. Our modeling tells us how many acres are needed to be planted, when they need to be planted, and when those acres need to be harvested. The total cost to do the Ag portion of this project is $60 million. Those costs go from the start date of June 2007 when we began, until the date the plant begins operation, which is about three years down the road.

We believe that the sugarcane is the way to go. Our calculations tell us that, once the facility is running, for every unit of fossil fuel energy that we put into the project, we will get a return of 13 units or more back. The sugarcane will bring economic certainty to the region because it is a sustainable, reliable, and profitable crop for the area farmers and landowners. We also know that we will have 300,000 tons of biomass available each year that eventually can be converted into cellulosic ethanol, or other products, once the commercial technology to make those products become available. Based upon Fulcrum's presentation earlier today, if they are able to do 120 gallons per ton, this extra biomass could be an extra 40 million gallons of low carbon fuel ethanol that is just waiting to be had.

In our case, we have been working very closely with five area farmers who have assisted us in developing a formula that we think is the basis for the contracts offered to landowners and farmers, something we were talking about a little bit earlier about how to get this thing going. CE&P needs a continual source of cane to run each facility. We need to not only ensure our inventory, but we also need to ensure the cost of the feedstock into the facility. Our understanding is the farmers and the landowners want certainty and profitability from the crops that they grow. Our mutual opinion is that both can be accomplished with our program. CE&P would pay an annual rent for the land, we would pay the farmers a guaranteed profit on acres they have in service, we would actually plant and harvest the cane, and we would pay the farmers back for all costs associated with growing the crops, such as the cost of water and fertilizer. This model gives the landowners a nice return on their land, the farmers will have certainty if they are part of our program, it also reduces the amount of expenses a farmer may have since they would be converting fuel crops to cane, which reduce the amount of work currently being done on those acres if they were growing alfalfa or Sudan grass, or such. This model also ensures the facility can accurately figure its cost and bring certainty that that can be paid, and profits generated for the owners.

The near term is now. As mentioned, we have acres growing and the sugarcane is being used to currently seed the new acres that will be needed. Question 4 that the staff had asked is the question about water, and that comes up every single day. Sugarcane does use quite an amount of water to be grown. It uses about the same amount of water as the fuel crops that are currently growing in that area, such as the Sudan grass and alfalfa. More importantly is that all the cane we grow will be used within the facility, or used as seed cane for new acres. None of the sugarcane will be grown and left unused if a market for that crop disappears like it has done in the past. In cases like that, a great deal of time, expenses, resources, time, etc., went into crops being grown, and at the end there was no market for the crop, and those crops were either destroyed or left to rot. It is just a waste of resources and money for the folks that had grown them. In our case, it will all be used.

The cane that is brought into the plant for processing also retains a large amount of water, and CE&P, along with Fagan & Dedini, our engineering companies, have found ways to collect the water that comes out of the cane, and we could clean that up and use it within the plant. I do not know if we are going to be quite neutral on water, but we will be pretty close, not using a whole lot of fresh water to run the facility. This can reduce the amount of water needed to run the facility.

As to Question 5, we have two types of cane growing in large numbers now. We have also had more than 15 other types of cane growing from local greenhouses and test areas in our effort to determine which would be the best varieties for our application. All this research has been done and funded through the original founders and investors of CE&P. We have not received any agricultural or USDA support on these tests. We have also had national and international sugar experts visit the Imperial Valley and give us their input on the best way to grow the cane. All of this has been done with a great deal of cost. As mentioned yesterday, 80 percent of our $15 million development budget is being spent on agricultural, permitting, or engineering costs. And then, again, the entire Ag model from day one to when plant is running, we are talking about $60 million to get this industry on their way. CE&P feels that the land that the Imperial and Palo Verdes can support is up to five facilities without having an effect on the food chain, or causing food prices to go up. This is because the acres we will be using are currently growing field crops and they are not growing fruits or vegetables. There could be a future opportunity to develop sugarcane in Mexico. Our preliminary research indicates that we could bring extracted sugar into the facilities, and that could be used to produce additional gallons of ethanol, while biomass could remain in Mexico, and they could use that as fuel for their power facilities. We have had some preliminary conversations with some entities down in Mexico to do this, but we are pretty much focused on getting our first plant up and running before we start doing anything like that.

Well, again, it was suggested staff put up a slide talking about key policy objectives, and there are five points here, GHG reduction. Gosh, we are doing that, we are reducing the greenhouse gas emissions. Petroleum reduction -- we are doing that quite a bit, 1.5 million barrels. Alternative fuel use -- we are already moving into that. The state is going to a 10 percent blend in a few months.

In-State biofuel use -- absolutely, it is going in that direction. In-State biofuel production -- I think we are one of those answers. So we are kind of answering a lot of the key policy objectives that have been brought up.

And then one last thing that we have not really talked about a lot, we have the electricity and we have the ethanol, but we also have an anaerobic digester on our process. And in Brazil, what they do is they take the mass and they simply just put it back to the field, and we cannot do that. So what we are able to do is clean up the water, we can use the water in the plant, and we will also be able to create a fertilizer with some of the solids, and the other solids can be put into an anaerobic digester which will be created biomethane; as mentioned before, it is 900,000 million cubic feet. So we are pretty excited about that and we are probably -- I do not want to jinx us, but we are a few months away from having a term sheet and maybe even a contract with a major oil company that wants to take all this biogas from us, as well as the ethanol, and possibly even the electricity. So we are pretty excited about the way things are going, and I think it brings a lot of opportunity to the region and to the state, and we are excited to be here, and I will answer any questions you guys might have at the end of the panel. Thank you.

MR. McKINNEY: Great. Thanks very much again, Dave, for the informative presentation.

MR. RUBENSTEIN: And if I can, I have a couple more of these informational sheets and I will just leave them on the front desk.

MR. McKINNEY: Great, thank you.

MR. RUBENSTEIN: Thanks.

MR. McKINNEY: Let's see, next up. Phil, would you like to go next? Okay. We have Phil Treanor, who is a Project Developer in Colusa County.

MR. TREANOR: My name is Phillip Treanor. I reside in Yuba City. We have been talking with the CEC for many years. I go back to 1989 in the ethanol business. I have never built a plant, but I have done a lot of work in trying to figure out how one should be built, and what time of feedstock one would use in order to overcome the regulations that may be passed along by the State of California. I would like to show this PowerPoint, and this is going to be very short and sweet.

All that I am saying now has been proven by --

MR. McKINNEY: If you could speak directly into the mic, it is a directional mic, so it is kind of sensitive. Thank you, Phil.

MR. TREANOR: Everything that I say has been proven by Clark Ornbaun. Clark has grown sweet sorghum for us for the last three years. Prior to that, we grew sorghum up in Chico, we grew it in the Madera area, we grew some down in the Imperial Valley, and this was all done in 1989. Going into this PowerPoint, the statements that I make have all been verified and fortunately you do not have to come to me to say, "Well, show us how you did it," because Steve Shaffer from the old -- from the Food and Ag -- was the one that kept track of a lot of this stuff. We grew sorghum this year and we got a little bit better than 40 tons to the acre -- green, on a single cutting. We did prove out that you can grow this crop on a 90-100 day basis. And we know that the sorghum will re-tune, and on the second cutting it will take about 85 days to make the second cutting. But we did not take the second cutting this year, south of Williams in Colusa County, but we were able to get two complete cuttings back in 1990 at University of California at Chico, under the auspices of Professor Mauser. In fact, we were looking at seeing how far we could go to get a third cutting.

With the sweet sorghum that we have used, and we were fortunate to be able to get the variety that we needed, the crop has grown with no pesticides or herbicides this year. The amount of water, when compared to the same volume of acreage that you would grow corn on was less than 50 percent of what it would take to grow corn. The sorghum does help with the soil because of the deep root systems that follow the make-up of the sorghum.

These statements that I have made have all been verified and we have done it now for three years in Colusa. If you do get a crop in by April 1, it can be harvested some time in July. If you do get the re-tune crop within 80 days after that, you will have a second crop.

If we were to install the equipment that we are looking at right now, we will not look at sorghum as being a prime product from which to get the ethanol, we would look to get various components. And the components that can be brought off this is you can get a wood product. And from each ton of sorghum, you will get around 50 board feet of lumber. And I have some samples here that people can take a look at if they are interested.

MR. McKINNEY: Did you bring your little case of samples?

MR. TREANOR: Yes, I did.

MR. McKINNEY: That is pretty interesting.

MR. TREANOR: I have got it back there somewhere. And it is, it is a neat package because you can take the lumber product and make particle board or medium density board, or flake board, whatever you want to do with it. The second product that you can take off this, instead of putting the -- first of all, you take the outer portion of the plant itself, and that is what puts into the wood product. When you strip that away, you have the soft inner portion, and that can go into either a flour enhancer, which would make for high fiber additive for bread and stuff like that, or you could put it into cattle feed. Today, if I had the plant going, I would think that I would like to think it would go into the flour side because that is what you eat, that is what you see on TV, they are always telling you about high fiber. And high fiber for flour comes out of the lumber. You will get one pound of natural wax off this plant and that does not sound like very much, but when you look -- you will get 40 tons to the acre and you will get so many acreage of plant a day, it will be up to maybe a ton of wax a day. And that is all finished with around 600 pounds of silage.

We know that there is land available because of the conditions the farm is up against. Last year, the farm that grew corn did very very well, this year the farm that grew corn probably lost its shirt, conditions being what they are. Last year, the farmer that grew hay did very well, this year the price of hay is so low that you could not even go out and afford to buy a matched -- prices dropped probably by two a third of what the price was. The water needs for sorghum is greatly reduced and this is one of the pluses that we would have. Its exercise in pesticides are eliminated, fertilizers are really reduced when comparing to any other crop, and the sorghum can clean up polluted soils. And what I am referring on that is that we could use brackish water, we could use polluted water, we would probably have to change our concepts as to how we would use the components, where we could not use some of the components that we would look to for, let's say, flour, we would put that into a generating plant. What you have to do is learn how to mix and match.

And I use the word "if," and I have to kick myself and say, "No, you can't use that." "When" we put one of these plants in, I think it will go a long way to making a new industry in the farming community. David did a much better job on telling you what they can do in the Imperial Valley, I do not have to go over that, I am glad you were ahead of me because you did a much better job than I could have done on it, but what David is looking at and what we are looking at is very very similar, there is almost no difference. The change of what he spoke about was sugarcane; we speak about sorghum. And both of them put out molasses. Some of you, when you leave here, will probably say, "Well, why would you do one and not the other?" If you grow sugarcane, you can take the sugars off the sugarcane and sell it for domestic sugars, white sugars. You cannot take white sugars off sorghum. That is the big change. But other than that, I think both plants are very much alike.

If I can get this to work properly, I will show you some of the -- yes. Well, I said that we had done some planting in Colusa County, this is a photograph of some of the plantings that we did back in 2007, so you can see, this is our third year. This is how we did it, this is just -- Dino Lekos and I did all this. We crawled around the dirt and this was -- Dino's son-in-law grew this for us in heavy dirt. Same thing and what we did was we put the pick-up in there so people could see the height that this grew to. Fortunately, that year we did not have any real big winds, so it stood up very very well.

If you would just give me a minute, we have got a couple more pictures, and then I am finished with it. But what I would like to remark on is that, in my opinion, when you speak about sustainability, and afterall, I am only looking from my point of view, in order to have anything that is sustainability, I think you have almost got to go back to the farm, you have got to go back to the land. You have almost got nothing in this country where you can point your finger and say, "This is sustainable." You take the hot springs, I am not using the right phrase, PG&E has -- yeah, geothermal, now, that could be a term that is sustainable, but all we have to do is have a little bit of a shake, and all those switches are on, and they do not have anymore hot water anymore. I have spent some time down in

New Zealand and I spent time in the area where they have their geothermal, and I finally ran across an individual who was willing to take time to show me the whole system, and what he said -- now, this is in the late '80s -- he was claiming that their geothermal was reducing every year because they had all tapped into it so much, and it was not reproducing itself. But I believe that if we are going to get a sustainable product that would help the country as far as the energy goals, I think you have almost got to look back to the farming community.

This photograph is the demonstration acreage that we had in Colusa County this year, and this was photographed on June 15th, we had planted this on May 27th. Well, I am a heck of a good photographer, but I just cannot make these things work. No, I finished. We would like to show you more, but I think some of the people from the CEC were able to see what we did. We were able to prove all these numbers that we came up with. Clark Ornbaun was good enough to come down here because he can give you any answers that you need as far as how he grew this, and what he was up against, and what his returns were. I appreciate any time, the time you allowed me, and I would like to maybe in the near future meet with the CEC and see if something can be done because, if we are going to do something, and I speak of "we," our company, we are going to do it next year. If we do not get it next year, I think we waited to long. I do appreciate your time.

MR. McKINNEY: Okay, thanks very much, Phil. And one quick question for you. What is the water application rate? Is there an average? Or does it vary by region in the state for sweet sorghum?

MR. ORNBAUN: We use the 2.2 acre feed on that plot -- well, I am using -- half the amount of water I am using is our quorum.

MR. McKINNEY: Okay, great. Thanks. Okay, next up we have Carson Kalin with Kalin Farms.

MR. KALIN: What you are seeing here is a green harvest of sugarcane and the business end of our sugarcane harvester. It is an impressive machine. It is made by Camaco and this machine can process up to about 100 tons per acre of biomass without any problem.

MR. McKINNEY: I want to know who is taking that picture.

MR. KALIN: I had the good sense to put it on a tripod. Imperial Valley resources energy solutions from renewable resources. We are three farmers from the Imperial Valley who started growing sugarcane 11 years ago -- Larry Fleming, Craig Elmore, and myself. We asked for help from our engineer, Michael O'Leary, who learned the sugarcane industry while running and managing all aspects of a sugarcane mill and refinery in Malawi, Africa, for 10 years. Shortly thereafter, we hired Dr. Charley Richard, sugarcane agronomist from New Orleans, and familiar with sugarcane throughout the world, and we began testing varieties of sugarcane to determine which were the best for a desert climate. You heard Mr. Kaffka speak a little while ago about the world record beet holders, and here he is right here, Craig Elmore. He may also hold close to a world record on sugarcane. Anyway, to date, we have looked at over 100 different varieties, and we are looking forward to harvesting our next production trial in October. It was Imperial Sugar from Texas who owned the sugar beet factory in Brawley and, at that time, it was their idea to give sugarcane a try in our valley. The first year, a group of farmers were put together to plant a small test plot, to see how it worked, and as you would expect, there was a huge learning curve. Some dropped out, convinced that cane would never work. I was one of the new growers. We changed our cultural practices a little and the results were not too bad, it was better than Texas, and it was better than Louisiana, and we were nipping at the heels of Florida. It actually looked like cane could be a viable crop for us. Larry and Craig, both long time beet growers, were very familiar with the politics of sugar, and began making trips to Washington to see what could be done to acquire some sugarcane allocation. After two years of many trips to D.C., they were successful in having language put into the Ag Bill to allow new states an allotment of sugarcane sugar. That same language is in the current Ag Bill today.

Meanwhile, back on the farm, we began to develop a concept for a different kind of a beet refinery, one that would also process sugarcane, one that would rid itself of coal fire boilers, and use bagasse, the fibrous portion of sugarcane remaining after the extraction of sugar. Bagasse is the renewable fuel source that will be used during the sugarcane harvest to generate all of the energy necessary for the factory, as well as energy to export to the grid. We had already committed to the idea that our sugarcane would not be burned for harvesting, but would be harvested green. We found that the residue cane left in the field could easily be baled in our very dry climate, and stored for later use. We ran the numbers and it looked as though the residue might be able to power the feed factory throughout the sugar beet harvest. We were no longer relying upon fossil fuel, and it was time for a serious look at the entire concept. We approached the Imperial Irrigation District and were successful in acquiring a substantial grant, along with some other cane growers in the Valley who also were given grants. Bundaberg Foundry from Australia was commissioned to assess the sugar processing portion of the factory, as well as make recommendations on a new cane receiving facility for the factory. Desmet, the engineering from Holland, was included, as it was their diffusion technology that was being used in cane and beet factories, and possibly could be integrated into our project. It was Bundaberg who characterized our project as an energy project, above all. And their business is sugar. ICM, Lurgi PSI, and Altech were all brought in to engineer the ethanol portion of the project, and footprints within the existing factory were laid out for the ethanol facility. Foster-Wheeler, a boiler engineering and manufacturing company, was contracted to design a boiler system capable of burning bagasse and cane thresh, two very very different fuels, one at 60 percent moisture, and the other at 10 percent. Burn trials were conducted at the University of Utah in conjunction with Detroit Stoker. Samples were sent to labs in Holland, and results were quantified, compared, and verified. These data would provide the necessary information to determine the power generation potential for our project. We scheduled a week-long session for all of our consultants to come, a time to marry all these ideas together and to distill all the concepts. A consensus was reached, all were in agreement that this project, based upon proven technologies, is not only viable, but will provide food, renewable energy, and low carbon fuel.

So here is the concept, sugarcane commercialization -- sugar beets provide cattle feed, beet pulp, refined sugar, molasses; sugarcane provides two sources, they provide the Billets, which provide sugar, as well as bagasse for fuel, and a residue is able to provide energy during the off-cane season, the sugar beet season, capable of powering 30-40 Megawatt power plant. The ethanol produced through corn, or through molasses, or syrup, of course, the by-product is carbon dioxide, and within the refining system in the factory, CO_2 was used in that refining system for both beet and cane molasses. So we were able to recycle our CO_2 right back through the factory.

So capturing the value added. Biomass to renewable energy conversion to steam and power. Sugarcane to sugar, sugar beets to sugar, corn to ethanol, molasses and syrup to ethanol, electrical power to our customers. The power of cane -- 20,000 acres of cane results in about 415,000 tons of coke, or about 42 barrels of oil per acre, per year, forever. And that is equivalent to about 45 Megawatt years' gross output available, every year, of renewable energy. So, what an energy crop! Our engineer put this together for me, and he is making the comparison of sugar and bagasse and the amount of energy in it, equivalent barrels of oil per acre are 222. At $68 a barrel, that is $15,000 an acre -- what you are looking at is about the same numbers -- we are green.

The greenhouse gas equation, factory impact. All coal-fired steam generation is retired. All natural gas-fired steam generation is retired. Highly efficient boiler systems replace the existing equipment. The process operations are optimized to increase energy efficiency. Carbon dioxide derived from the ethanol distilleries utilized in the sugar process, and the existing coke-fired line kilns are replaced to reduce harmful emissions, and to also reduce the rail cars of coal and coke coming into the Valley -- a huge number of rail cars that will never come again. Field impact -- the beet crop comprises a total fiber weight of about 110,000 tons. Cane crop comprises total fiber weight of about 120,000 tons, bagasse another 245,000 tons of cane residue. That annual net addition of biomass is about 475,000 tons. It is 43 percent carbon, therefore the carbon intake is about 204,000 tons annually, which represents about 750,000 tons of carbon dioxide equivalent, assuming that everything is absorbed from the air and there was not a different crop or crop alternative that could have grown there.

The bottom line -- sugarcane yields the most biomass growth each year, sugarcane offers the most effective carbon sync while providing our Ag economy with a high value crop option. The biomass fuel sources enables the project to achieve a carbon neutral footprint; it utilizes the factory sourced carbon dioxide to clarify the sucrose juice, which further improves the balance in favor of the environment, and it remakes the growers' outlook to where his idea of yield is now measured in Btu's. It presents a change in the permitting process approach where the total air quality impact is considered. The facility offers the opportunity to utilize other agriculture waste materials as fuel sources, as well.

Fuel supplies. The bagasse -- we are getting about 15 tons per acre, 20,000 acres, that is about 2 million Btu's, the sugarcane even more. Now we make the comparison of natural gas. The equivalent energy, if we purchased natural gas to do that, at today's prices, would be about $30 million. That is what we have saved ourselves.

Project integration benefits: Environmental benefits -- complete recycling and use of wastes to produce valuable renewable byproducts, substantial air quality benefits, enhanced water management capabilities, carbon dioxide absorption, homegrown renewable energy source. Economic benefits -- the new Farm Bill includes California and as a new sugarcane producing state. Within the Imperial Valley, 20,000 acres of sugarcane and 25,000 acres of sugar beets would generate about 20 percent of total Ag sales from only 10 percent of our farmed acres. It introduces a new high value crop that creates new employment, it expands local industrial base, and it provides for energy cost ability. The social benefits -- it secures existing sugar industry jobs. We just lost a factory in Mendota. Brawley is the only sugar beet refinery left in the state of California, and we need to keep it here. It provides new full-time stable jobs, it provides new skill training opportunities, it increases the local tax base, and it generates revenue for essential services, and adds security to the Ag sector. The Imperial Irrigation District consumer benefits -- higher and better use of irrigation water, economic benefit per acre foot of water applied, and that is how we need to measure this: what is the highest return per acre foot of water applied? Sugarcane farming employs the best available water management techniques. It creates a homegrown source for renewable power and the bioenergy crop offers energy priced stability. Value added stays in the Valley, where new and better paying jobs create new customers for the Imperial Irrigation District's services. It creates significant new air and water quality environmental benefits. The facility would provide the Imperial Irrigation District with a valuable summer peak power demand as that is the time of year when the only power we are generating -- or all of the power that we are generating -- is not used for the plant. Power-off take agreements with the Imperial Irrigation District, facilitates retention of local ownership. These are the people that helped us get this project to where it is today.

Funding -- in answering the questions, it seems to me that one of the premises that needs to be used in deciding how the funding is to be distributed would be to have a diverse array of products from the projects, if possible.

Finance -- every component of our project uses proven technology, however, because this is the first project to combine these technologies into one model, financing has been difficult, and this is ironic because the beauty of this project are the efficiencies created by the integration of these technologies. Past prospective investors tried to fit our model into their own little box, and they have been unable to quantify the value of the synergies that make this project so viable. Therefore, loan guarantees, coupled with fuel off-take agreements, and long-term power sales contracts should provide the needed security to get this project financed.

Feedstock contracts -- the beet factory contract will serve as a good starting point for multiple year sugarcane contract. Producers are familiar with it and reactive in negotiating with factory. Producers are very aware of their costs and production requirements, therefore, the sugarcane contract that is negotiated must adequately compensate and incentivize the producers to grow cane. In the beginning years, it will be prudent to make cane attractive enough that growers are willing to change long-term farming practices. The fact that sugarcane culture is a multiple year crop will present a challenge in crafting a workable contract. Financial assistance via AB 118 may be a solution for the cash flow needed for that initial cane acreage expansion, as Dave showed here earlier. It could take up to four years before any cane was actually processed.

Water -- our water resources are being stretched thinner and thinner, and we seem to have forgotten that one of California's greatest resources and economic engines is agriculture, and yet we see productive acres being fallowed without any consideration for the loss of long-term carbon sequestration, much less the economic impacts in those areas affected. From a policy standpoint, what sense does it make to fallow productive agricultural land producing California food, transfer that water to an urban growth area to support the continued population growth, along with all the carbon baggage that that takes along with it. I am sure that that carbon footprint has been defined very well on a coastal plain, but I will bet you that the carbon that we were sequestering on that farm that is now fallowed has not been taken into account, and that carbon needs to be accounted for wherever the water is being used, in my opinion.

We need to continue researching the minimum water requirements to sustain acceptable and economically viable cane. Further funding would be necessary to improve water management techniques and methods, and more fully understand the long-term impacts of dead level planting and drip irrigation.

The process -- through the unique integration of renewable power and steam generation, coupled with sugar and ethanol production, we have developed an industrial model that secures the highest and best use of the available feedstock and energy sources grown locally. The selection of the appropriate process technology gets a great boost from the nature here due to the maturity season, timing of beet and cane and at different times of the year. We continue to research and improve methods to collect and delivery available biomass, and to achieve a better energy balance while ensuring the optimum product, quality. So additional funding is desired at this time to conduct engineering for the proposed factory lay-out and integration.

And finally, local business expansion -- the creation of this facility will generate further business opportunities in what the *Wall Street Journal* recently described as "the most economically depressed region of the country, with over 30 percent unemployment." The *San Diego Tribune* had an article the other day, and I think they described us as their "forlorn neighbors to the east." So an industry like this would be a real shot in our arm.

The last question that was asked, I think, had to do with importing sugarcane and palm oil. The CDFA regulations for bringing sugarcane into the State of California requires that all that sugarcane be heat treated before it comes in for disease control, and I know Dave would agree with me on this completely, the reason for their care in bringing cane seed into California is to try to keep the diseases out. So I would say that is a complete non-starter to do that. So any questions?

MR. McKINNEY: Great. Thanks very much. It was a very interesting --

MR. KALIN: Did I make it in 15 minutes?

MR. McKINNEY: Not quite, but you had your audience.

MR. KALIN: Thank you.

MR. McKINNEY: Thank you very much. And I think we will do questions at the end of the panel. Next up is Clark Ornbaun with Ornbaun Farms. Sorry, I should have had to you after Phil.

MR. ORNBAUN: I just came in support of Phil's and we grew the sweet sorghum for three years there on the ranch, used a little bit more than 2 acre feet, about 120 units of nitrogen, it is more sustainable for us than it is for the yellow corn, it is less energy.

MR. McKINNEY: Can you tell me where your ranch is located?

MR. ORNBAUN: We are about an hour north on I-5 between Arbuckle and Williams.

Mr. McKINNEY: And then you mentioned you grew the trial this year, and what did you do with the crops since there is no bio refinery in the neighborhood?

MR. ORNBAUN: The previous years, we fed it, we baled it, we swapped it, dried it instead as some goes to the dairy industry and some goes to the feed yards. This year, it is still standing. We have been still taking the sugar samples off of it, and we will do the same thing this year.

MR. McKINNEY: Yeah. And in your view, is this a viable commodity crop for your part of California?

MR. ORNBAUN: Yes, it is. It depends on the price of the product, how much we can get paid, but as far as for production on a hay basis, like Phil said, last year, well, the price of hay was much greater than it is this year. So if the price of hay is high, maybe I can make it on just growing hay. When the price of hay is low, it is not viable. So maybe with ethanol or lumber products and wax, it could be a new industry for our country.

MR. McKINNEY: And I imagine the next steps, I mean, for you to kind of consider long-term production on your ranch, I assume there would need to be a buyer or a bio refinery in the vicinity?

MR. ORNBAUN: Correct, with the long-term contracts for two or three years, so we knew we could sustain it.

MR. McKINNEY: Yeah. And do you see any of those in that part of California?

MR. ORNBAUN: We have the industrial part there in Colusa that is acceptable to -- open to those ideas. Yeah.

MR. McKINNEY: Okay. I do not have anymore questions. Phil? If you could speak into the microphone, Mr. Treanor?

MR. TREANOR: Clark, would you tell them what crops you are growing and what you have grown in the past?

MR. ORNBAUN: What we have grown in the past, we started with sugar beets, that was what I was raised on, sugar beets, corn, beans, now at this time I grow rice, almonds, wheat, alfalfa, beans, I have grown tomatoes before, we will have them again. That is it. The North Valley can grow most anything.

MR. McKINNEY: And which of those would you not grow if you were to expand the acreage to sweet sorghum?

MR. ORNBAUN: It is depending on the price, the price of the commodities, we would move the -- that is what I do now, I move different crops around, so with contracts and pricing of commodities. So we will grow less alfalfa or less rice and more sorghum, depending on the price.

MR. McKINNEY: Okay.

MR. TREANOR: And I would ask you to advise -- to make a remark as to the acre feet of water it takes for these different crops.

MR. ORNBAUN: Yeah, well, that is what helps me also is to use less water. This year it was 2.2 acre feet for -- on a dry matter basis, it will be 4-5 tons an acre bale, load of wet matter is just about $.40.

MR. McKINNEY: And what is your water application for rice and processed tomatoes?

MR. ORNBAUM: It is, depending on the soil structure, rice would be from 3-7 acre feet, and then tomatoes also from 3-5, but I have used as much as 7 in gravel ground for tomatoes. Then, for an average, for corn, tomatoes, alfalfa, in my area it would average, I would say, probably 5 acre feet, and this too, less than half that.

MR. McKINNEY: Okay, I do not have anymore questions. Well thank you very much, Clark.

MR. ORNBAUM: Thank you.

MR. McKINNEY: I appreciate your coming here and making the time to share your views. Next up, we have an agenda change, we have Thor Bailey from Sustainable Farm Systems.

MR. BAILEY: Good afternoon and I will introduce myself, Thor Bailey, and I am associated with Phil Treanor and, indirectly, with Clark. I am here mostly just to give a real brief overview of an integrated energy park concept, we are not in the position to address the specific issues and carbon values to the park yet because we have not really started the feasibility study, but I find it interesting. We are very similar, maybe the other end of the bookend on the Valley or the State with Carson's presentation down in the Imperial Valley with the Brawley situation. The opportunity for us is driven by an Ag waste stream mitigation program or need. We started out with the cannery industry, the sugar waste cannery industry in Northern California, Yuba City, Oroville, Gridley, there are quite a few small canneries in the area that have a sugar waste stream, and the park is an ideal location for a small Ag-based system. California Department of Food and Agriculture, about 20 years ago, designed -- and it is probably one of the better small-scale designs -- for a similar -- between a 1 to perhaps 5 million gallon a year plant. And the problem that is symbiotic with what Phil

Treanor and Carson has been doing with the sweet sorghum is the sweet sorghum could be a supplement, or sugar base for the waste stream for the canneries, so really what we have got is an opportunity to solve a problem for the cannery waste disposal industry while we can supplement it, or support it, with a more stable source of potential sugar from sorghum. The industrial park is in the heart of Colusa County on Highway 20, just about a mile south of Colusa for those that are familiar. The location has been analyzed, looked at for several years. Ed Hulbert, the Manager, has offered an opportunity and there is land available for a mixer in place, obviously it is a rural county with the need to create jobs and our problem is very similar to Carson's, almost on the other end of the spectrum, we are -- all the technologies we are proposing are proven, but integrating the system and the team behind it is not. We have got the same problem on just completely different ends of the scale where this size of project that they are proposing in Brawley, it takes the compelling return because of the scale is potentially better than small scale, although potential not to work is scaled up, also. And in Colusa, the reason we are there is because the park is there, the county is there, it is an Ag-based community and county, and we feel that we can demonstrate literally for the State of California, if you will, a potential to make a small project work because that is all the resource we have to work with in the area, anyway. We are not looking at, you know, bringing in by rail, or trucking a bunch of material to the project, we are looking at a roughly 30-mile radius to take advantage of what is available.

So the concept is to integrate two or three systems, the anchor of the project is the green box in the middle, anaerobic digestion, there is potential to recycle waste stream from a mushroom plant that is operating, it is a huge energy consumer, but it is also one of the largest employers in the County, 24-hour a day, a year-round operation. The original group that I was working with, again, was tied to the canneries and the waste stream from the canneries is a problem in our area, it is tied to water quality because the canneries produce a huge amount of water, and then the waste stream could be run through a digester, potentially. If there is an economic model difference between, say, the Colusa project and the Brawley project, it is we are producing to make it vertically integrated, where all of the material forming the products produced are consumed with the farmers, we are not really trying to get into the wholesale transportation or industrial markets.

The three key components is feedstock technology of markets, and each one of those subcategories is available within any 30-mile radius of the Colusa facility. We are looking at each of these systems being stand-alone, but enhancing their bottom line revenue to operate independently, but when the Management and the energy production is within the park, it will enhance the bottom line. This is a commercial demonstration, the technologies are proven. We have the financing defined for the anaerobic digester. We would be marketing the soil amendment primarily to the landscape and nursery markets with whatever surplus to the Ag community, the cannery and residue and ethanol from liquid fuels -- I mean, producing liquid fuels, the sweet sorghum, I am impressed with what I saw with Phil's demonstration, with Clark's growing, and I have got an agriculture background myself, and I think there is definitely a viable problem there. And another driver in the area, there is a large growing and expanding nut crop industry, both walnuts and almonds, along the I-5 corridor, and we are looking at a small scale, 1 Megawatt, wood waste gasification system potentially supplying energy to the grid, and then obviously the biofuel crop production is well defined. I remember working with Steve Schaefer years ago when he was working with Chico State, I am from Chico myself, and it is a viable program. And then carbon sequestration is an issue that we are looking at using waste stream water in marginal ground and perhaps growing trees or other carbon sequestration crops.

The anaerobic digestion is a system being demonstrated. It is functioning and you might say going through the shake-out phase up in Tillamook, Oregon, that will be engineered into the project. The carbon soil amendment is one of the values coming out of the digester. This is a couple pictures of Phil's sorghum from a couple years ago, and this is an example of the waste stream available. That is a pile of prune pits on a slab and the sugar value is there, it is an excellent source of sugar, the problem is it is seasonal, and there is a lot of material in a short amount of time to deal with, and that is similar with Brawley, but also hopefully we can integrate our system with the sorghum to help balance that.

MR. McKINNEY: I am sorry, if I could ask you for that previous slide? What is done with those waste streams right now?

MR. BAILEY: Generally, they are being burned into co-generation power plants, but what is starting to become a problem is there is no consistent program, in other words, there is not a long-term contract, you take it here this year, and over there next year, so what we are trying to supply is a constant or a specific source to take it to, over a long term period. But I would say generally they are being burned into co-generation power plants.

And our sustainable farm systems, that is -- "sustainable" is an easy word to say, but it is hard to implement. In a way, we are closer to survivable agriculture than sustainable in California, right now. When water quality is an issue, we have reservations of the potential volumes that are being -- biofuels being produced just because of land availability and water issues, but our company is involved and been working with the biomass co-generation and waste management industry for agriculture for close to 30 years. And with that, I would be glad to answer any questions.

MR. McKINNEY: I do not have anymore specific questions. Pete, did you?

MR. TREANOR: May I ask a question of him?

MR. McKINNEY: Please, Phil.

MR. TREANOR: When you had that photograph of your prune pits, when you have a pile of pits like this, one of the problems you have before you can sell it into a generating plant is you have to dry it, and these probably come out of the Sunsweet, probably, and they probably come out at about maybe 75-80 percent moisture content. So in order to do anything with this, you have to spread them out and hope you get a lot of sunshine. Other than that, you will take the generating plant and you will bring it down, it will not operate.

MR. BAILEY: And with that, that is a good point, Phil, thanks for addressing that, and within the system at the industrial park, we would have a screening and classifying and drying facility specifically to deal with the different wastes streams.

MR. McKINNEY: And then, Thor, if I can ask, so specifically where are you in terms of project development and the types of funding assistance your company is looking for?

MR. BAILEY: We are open to suggestions. And when I say that, the nature of the project is the digester system is the key to being the anchor within the park, supplying the heat and energy to the mushroom plant, and we have been waiting literally close to two or three years now for this demonstration plant in Tillamook to validate and guarantee the energy efficiency. The group behind that, Phil Treanor is aware of the engineer, Leon Breckinridge, and once that is in place, we are going to get serious about doing a feasibility study and then forming the entity that will manage the whole system. So within 30 days, I should have a better answer to your question.

MR. McKINNEY: Great. And do you know what the capital costs are, roughly, for the digester system?

MR. BAILEY: It is -- right now, it is about a Megawatt in size or in scale. When I say that, that depends on how much gas goes back to heating, or supplying energy back to the mushroom plant, but if it is power generation, it is about a Megawatt in scale, but initially it can be scaled up as we get comfortable with the efficiency, and the ballpark price is about $3 million.

MR. McKINNEY: Great, thank you. And I guess, just as an observation, to work on sustainability, this is just one of the nicest examples of kind of local close loop systems that I have seen. We really want to try to tap waste streams from a specified geographic area.

MR. BAILEY: Yes, and I appreciate that. Actually, that is another motivation to do this, is it can be scaled up. Obviously, everything is site specific in this industry, but the benefit to the State of California, even though we are focusing on the North Valley, there are other opportunities in other areas of the state. I would say that I have been involved in this biomass energy industry for, I would say, almost 30 years now, and we feel that agriculture has the best opportunity to, you might say the next 30 years, is to lead the direction of this biofuels industry. To date, in some ways it has been painted with one brush, it is about renewable energy, but there is economic development now and environmental waste mitigation and renewable energy.

MR. McKINNEY: Great. Thank you very much.

MR. WARD: Thank you, Thor. Very interesting to see that project. I used to drive up to Chico to go to college and go through Colusa all the time and, of course, that was not there then, but it gives me a good reason to go back up that way again. I really like the potential for the mitigation of the surrounding area. And I think that could be replicated around the state. I think it would be very very useful, and in addition to a positive economic development as you pointed out, and also producing fuels. I think that is kind of a threefer as I might look at it, I think it is really great to see that in Colusa, and as I say, it gives me good reason to head up that way again, it has been a while.

MR. BAILEY: Great, and there is an opportunity, if it is appropriate, at whatever time -- there is an open-door policy. Ed Hulbert, the manager of the facility, it is -- a farm family owns and operates the facility in addition to the farming operation, and they are open to the community and even the state coming up and visiting the site, and answering some more questions.

MR. WARD: Great, thank you.

MR. McKINNEY: So I had one question that I would like to try to ask of the panelists. This concludes the previous speakers, as well. So we have got kind of several classes of projects here, we have got some large waste to energy proposals that we heard from Ted, and Kay Martin spoke of, and then we heard specifically from Steve on a variety of feedstocks and from Ms. Radzian on oil palm, so one question for, say, the growers, is one of our themes over the last two day is that, you know, we have a modest amount of money available for investment in different parts of the fuels pathways, biofuels, and so say for the grower part of this panel, what specifically would an AB 118 funding opportunity look like? Are you looking at feasibility studies, or grants, or loan guarantees? I mean, we are just trying to get a sense for how to structure future solicitations to cover as much ground as we can.

MR. ORNBAUN: I would say for the grower's side, it is all pie in the sky, we have to produce a crop that can be paid for. So we would have to have a guarantee of a contract, but you also have to produce a crop. We do not believe we should be paid for non-production. You know, it would have to be guaranteed that, if I produce this many tons, with this much sugar, I would receive this much a month for this many years, and then we would go forward from there -- for my side.

MR. McKINNEY: And then I think I would ask the question for, say, the larger scale facilities we heard, so from Dave and Carson, I think the Fulcrum project is kind of in a different category, and I know both of you have already touched on this before, so maybe I can try to summarize, but it sounds like loan guarantees, Dave, I know is something you have discussed quite a bit, and again, giving kind of the modest size of the AB 118 funding program versus the capital cost for the scale of projects that both of you are representing, do you have any further thoughts on kind of these strategic applications of the AB 118 funds?

MR. KALIN: Carson Kalin. Yes, I think we still need some research on siting within the facility, the factory, and I think we need to put some more research into transport of materials from the field to the factory, the best way to get that done, and the most efficient way to do it with the smallest carbon footprint. Other than that, I would echo the loan guarantees, I think, certainly, gets the biggest bang for the buck.

MR. McKINNEY: And I know Tim Olson has championed creating kind of a feasibility study fund for much smaller amounts of money, say in the hundreds of thousands of dollars, but exactly for these type of permit development and additional feasibility work that I think you are touching on.

MR. KALIN: Yes, that is right.

MR. TREANOR: May I say --

MR. McKINNEY: Please, yeah, go ahead, Phil.

MR. TREANOR: From our point of view, and with what we would hope to do, we would like -- we will have to do a feasibility study somewhat, we have done a lot of work at this time, but my question -- what I have to answer is where would be put the first plant? The most logical place to put it is in Colusa because that is where we have our home ground. The most natural place to put it would be done in the Central Valley because you have got warmer weather down there. The best financial return we could get would be in the Imperial Valley because of the way sweet sorghum grows, we know that, in the Imperial Valley, you would get three crops a year, we know that in the Central Valley, we would get at least two crops a year, we may get two crops a year in Colusa, but we may not. But the thing is that, when you take the packaging that Thor has, and what we have presented in there, and you mix and match all these different things, in what is an existing and agricultural industrial park, I may be wrong, but I would think that within 90 days, we would have all our permits in place because we are not asking for -- we would not be looking at putting in generating plants, all we are doing is we are processing agricultural products. And I think we could probably do that in Colusa County pretty darn fast. So from our point of view, what we would like to do is, if we can continue to talk to the CEC, if we could get loan guarantees, but the next thing I have to ask of you is, what does that mean? Does the loan guarantee mean that I put up a letter of credit? Or do you have to put up a CD? Or do you have to put up a savings passbook? Or does the loan guarantee come out of the PIER Program that has already been funded by the general public? I get very antsy when I come to speaking to the federal government, state government, when you talk about guarantees because, so many times, they look upon a guarantee being that, okay, you put up your money and we will guarantee if we make a loan to you, that you will get the money; but if you go in on a letter of credit, the letter of credits states that you must have that amount of money sitting in the bank. So why would you want to go to the CEC or anybody else? So this is what I would ask of the CEC is that, the next time I come down and talk to you, when I get these answers, maybe it is not worthwhile going further at this point; but on the other hand, with what this panel has presented, and with some of the algae things that I have heard, and I have been in and out of this place yesterday and today, and I apologize for leaving like I did, but every once in a while I had to leave, but it seems like we are all looking for -- we all agree to ourselves that we have a good product, but now what we have to do is to figure out how do we install a plant. And I kick myself in the rear end because, if we ever put in a plant and it was to work, the public would get as much benefit out of it as I would, however, I have taken all the chance and paid for my own lunches. The amount of money that I have paid down here, I am paying for my parking tickets, I would be more than compensated for my first round of expense on the plant. Thank you.

MR. McKINNEY: Thanks, Phil. And I am still looking for that salary guarantee from the Governor, too, so I can sympathize with you. Thor and then Joe.

MR. BAILEY: Okay, to answer your question, Jim, as far as our group, we have already done all the feasibility, and it is definitely feasible. We are looking at probably a minimum amount of capital to do the engineering, actually -- time, labor, and hard costs to do the engineering, which is very little because so much work has been done over all the years. If all of the parts are ready, again, I am basing that on the digester group being at the table within a few weeks, but the waste stream from the canneries are there, the wood wastes from the orchards are there, the waste stream from the mushrooms, so everything other than where the sorghum might fit in, is a given for our project.

MR. McKINNEY: And then, Joe, can you state your name for the record?

MR. CHOPERENA: Yeah, Joe Choperena with Sustainable Conservation. And I can give you my perspective of the question that you just asked, and I would like to start off by saying thank you to Carson and Phil and Clark. Sustainable Conservation was able to purchase and get four different varieties of sweet sorghum donated for three different trial sites, demonstration sites, that Clark grew, and Carson grew down in Imperial and up in Williams, and you know, one thing that we see, which is very valuable, is looking at demonstration sites and really seeing how well these different varieties perform in the different climate regions and soil types. For example, two of these four varieties performed extremely well in the '89 through '91 studies that CDFA did, and the other two varieties, this time around, ended up performing much better. And they vary from site to site, as well. So as far as AB 118 funds, I think it would be very valuable to continue more demonstration sites and looking at different proscriptions and having farmers maybe have a little bit more flexibility on how they would grow each variety differently, and maybe in different sands, different spacing, and whatnot. And there is obviously several other types of renewable energy and waste energy projects that we are interested in pursuing and evaluating. And I want to reiterate a comment that was made earlier this morning regarding landfill gas and how much of it is wasted. The majority of it is wasted due to Air Board regulations and difficulty in permitting, and how that gas must be flared off. And often times you see projects that are funded by one agency, by one state agency, and then later that same project cannot come to fruition or has severe difficulty receiving permitting due to another state agency. So I think it would be valuable to look at kind of net environmental benefits and be able to see -- have the different state agencies work together and, even prior to projects receiving funding and being approved, have them kind of work through some of these permitting issues because this is something we see with digesters and gasification systems, and all different types of projects. And most of us who live in the Valley, we realize that the air quality is one of the worst non-attainment basins in the country, but at the same time, you have to look at that with what are the benefits associated with the project if it is helping the state meet its renewable energy goals and biofuel goals, and low carbon fuel standards. So that is all I would like to say. Thank you.

MR. McKINNEY: Okay, thank you. Dave?

MR. RUBENSTEIN: Yeah, and that is kind of where we are at this point in terms of our project. I think I mentioned this yesterday, we think there is about $15 million cost to get the blueprint in place to get this thing built, which would then be folded into the overall project, and that is why we are looking to AB 118 is to loan us some money, in that we think there is just three opportunities to invest in the development stage around -- which I got into and we have raised $6 million to date, and we think any kind of state or federal money to help us along the way, as I mentioned yesterday, a loan would be a good way to go, and then the third round would be the private equity, who would eventually be the project equity for the first plant and they would be a substantial stakeholder in. And the $15 million, as mentioned, 80 percent of it is agricultural run-up, it is permitting, the permitting process alone is, you know, the EIR's and the traffic studies, and the CEQA process, and all that, I mean, we are talking about hundreds of thousands of dollars that is getting farmed out to third-party engineers on behalf of the Imperial County to get this done, and the cost is just so high that any kind of assistance from the state to get done would be paid off handsomely once the project gets going, as mentioned in the informational sheet that I mentioned earlier.

MR. McKINNEY: And we are about out of time for this, but I wanted to ask Mike McCormack or Bill Kinney if they, our Ag specialists here, if they had any questions for the panel.

MR. KINNEY: Nothing off the top of my head. I would have to go through my notes, too many to sort through.

MR. McKINNEY: Mike, same with you?

MR. McCORMACK: Same with me. I will pass.

MR. McKINNEY: Okay, well, gentlemen, thank you very very much. It has been very informative. I really appreciate you taking time to come and share your perspectives and point of view, folks.

[Off the record.]

[Back on the record.]

MR. McKINNEY: I am going to suggest we just push on through, reconvene our biomethane panel, so Chuck White, and then Ken Brennan of PG&E also wanted to make some remarks, so why don't Chuck and Ken come up to the speakers table here. Then, also, for our public comment period, we have got one blue card from Tom Fulks with Neste Oil. Can I get a show of hands? Is there anybody else that wants to make public comments at the end of the day today? And then, Pilar, if there is anybody on the WebEx who wants to do that, they could.

MS. MAGANA: Do what? I am sorry.

MR. McKINNEY: I am sorry, I know you are multi-tasking. Public comments after this panel, so we are trying to get a sense. We have one blue card and see if we have anybody else on WebEx or on the phone. Whenever you are ready.

MR. WHITE: Sure. Okay, how do I advance this? Perfect. Okay, good afternoon. Thank you very much for inviting Waste Management and myself to speak to you briefly today on what we look to in terms of biomethane and biofuels potential in California. My name is Chuck White, I am the Director of Regulatory Affairs for the Western United States. I spend most of my time here in Sacramento because so much seems to be going on, particularly lately. I think I have got two or three meetings going on at the same time today.

Who is Waste Management? Well, our motto is think green, think waste management, and you may see our commercials. But this slide kind of shows the various kind of activities we are in, in materials management. We have a lot of collection vehicles, we have 3,500 heavy duty trucks in California. We run a lot of transfer operations once the materials are collected and aggregated, and transfer them to their ultimate place of use or disposal. We operate a number of disposal facilities. We have about 14 landfills in California, about 250 nationwide where the nations, North America's largest recycler, we had quite a tremendous commodity operation in terms of recycled commodities, although we have been hit pretty hard for the last couple years as a result of the worldwide recession, but we think that is bouncing back here in the near future. And last, but not least, is renewable energy. Waste Management is increasingly looking at itself as a renewable energy company. In fact, we recently formed a group in that white box, OGG, Waste Management Organic Growth, it is a wholly owned subsidiary of Waste Management and its focus is to develop new technologies to use organic materials and develop biofuels and energy from waste.

So one of my favorite charts is from a CEC report a couple years ago that was prepared by the California Biomass Collaborative. Steve Kaffka is here and he can probably speak with much more expertise about this than I can, but it says a lot. If you look at the actual biomass capacity that we are using, and this is in Kilowatt hours, but it gets easily translatable to transportation fuels, as well. In 2005, the bar on the left, you know, we are really way under-utilizing our total capacity from the various areas that can contribute to biomass energy in California. If you take a look at the very segments of each of these bars, the top-most is waste water treatment biogas, it is not really that much additional potential. The next bar down in the light blue is landfill gas, and we are really tremendously under-utilizing our landfill gas today in California. Most of it is being flared. There is quite a few landfill gas energy projects using turbines and internal combustion engines, but that is only about a third of the gas that is generated and there is quite a bit more immediate potential out there right now, and I will come back to that.

The next, the green area, is energy crops for which, you know, we are not really in that business, but the next one is, and that is municipal solid waste, and there is a huge potential of energy directly covering municipal solid waste to energy from a wide variety of technologies, including anaerobic digestion, gasification, and other types of processes that I will mention. Agricultural residues, this is a huge potential, as is forest residues that Waste Management has not really gotten into that much, but it is one that we are looking increasingly at, is can we marry our handling capacity, or transportation networks, our expertise in processing materials, to be able to feed these kinds of residues into energy projects that we may get started in the next several years.

So what is landfill gas? Landfill gas is kind of the focus we have right now because we collect a lot of landfill gas, and we flare a lot of landfill gas, and it is right now available to be used as energy. It is from the anaerobic decomposition of organic waste, it is about one-half methane and one-half carbon dioxide, and, in fact, the landfill was essentially a big anaerobic digester, it produces methane and CO_2 just as would an anaerobic digester, but on a much larger scale. Nitrogen and oxygen is introduced by air intrusion. When you have a gas collection system, the more you pull on that, the more you have a potential to bring in nitrogen and oxygen from the surrounding air; the less you pull, the more you have a chance of methane leaking out of the landfill, so you are constantly in a balance of trying to make sure you have the right collection pull on your gas collection system. It is a medium Btu gas, about half the Btu energy of fossil natural gas because of the carbon dioxide. There are some contaminants in that landfill gas that have to be treated and removed. Flow will increase while the landfill is still opened, but once the landfill closes, the landfill gas generation potential continues to decline over time.

The Energy Commission put together an estimate that maybe 600 million diesel gallon equivalents were available from landfill gas. The CARB and Waste Board put together a different approach to measuring how much methane generating potential, and that estimate has come down a bit from 600 to about 400 million diesel gallon equivalents are out there right now, and I think California uses about 3 billion gallons per year, so there is a potential for at least 10-15 percent of it being made up by landfill gas, alone. Assuming only 50 percent is economically recovered presently, that means 200 million diesel gallon equivalents. Waste Management landfills, we think there is a potential to produce 30 million diesel equivalent gallons in our own landfills here in California. Why is that number interesting to Waste Management? Well, we use 25 million gallons of diesel to run our truck fleet, and so we have the potential at some point in time of potentially converting our entire 3,500 heavy duty vehicles to landfill gas, or biogas from landfill gas. And, of course, it is a very low carbon fuel, as others have mentioned.

Well, what is the landfill methane capture strategy in California? Here is a chart from the Integrated Waste Board and CARB, and it compares what we are doing with landfill gas today with what we were doing in 1990. The interesting thing, in 1990, we were only collecting 10 percent diversion from landfills; now, in 2006, we are at or above 50 percent. But if you take a look at the total amount of waste in place, it has doubled in that period of time, so we have gone from 10 percent recycling and waste recovery to 50 percent, yet the amount of waste in landfills has doubled. And this trend is going to continue, landfills are not going away as much as folks would maybe like them to go away, they are still around. They still provide a useful beneficial resource and useful energy. The other thing I learned from this chart is to look at the green bar, which is the amount of waste in place in 1990 compared to 2006, that they actually had an active gas collection system, and only about 60 percent of the landfill gas had active gas collection systems, and now we have about 94 or 95 percent, so we really improved our gas collection efficiency. In just this last couple months, though, the Air Resources Board has adopted regulations to require landfills to operate with even more efficient collection of landfill gas. So we have got the system in place, the gas is being collected, now what can we do with it to really make beneficial use of it?

There are a number of factors affecting the landfill gas development, one is a finite number of landfills, and many have some development already, some efficiencies with respect to small sites or closed sites. Connection difficulties can be particularly a problem if you have got a remote landfill connecting to the grid, or to a pipeline, and even if you have a pipeline, right now most of the utilities have absolute restrictions on putting landfill gas into pipelines, which is something we would like to work with at the Energy Commission, our friends at PG&E, and others to see if we can get that turned around at the CPUC and allow treated, reliable landfill gas to be introduced, either for transportation fuel, dedicated, it can be wheeled to various locations to be pulled out of the pipeline, or be already used as a source of energy generation from stationary sources.

It is really expensive to produce energy from landfill gas as compared to just this flaring of it. Increasingly, the stationary engines that we use to generate electricity from landfill gas, in terms of turbines and internal combustion engines, are under increasing NO_x and CO limits and offsets and, in particular, there is the South Coast Air Quality Management District Rule 1110.2 that may even shut down many of the existing landfill gas generating facilities in Southern California because the cost that will be necessary to meet the standards for NO_x and CO in the South Coast by the year 2012. And, in fact, Waste Management is heavily investing nationwide on landfill gas to energy projects. Until just this last 2008 and 2009, we absolutely had none in California. In 2006, we had 20 projects in North America, and 30 projects in 2007, and in those two years, we did not have any landfill gas to energy projects in California because it is much more cost effective for Waste Management to invest in a landfill gas to energy project in Oklahoma or Texas, where the Air Emission Control Standards are not as stringent, and it is less costly to comply with. So we just continue to flare. Now that is changing quite a bit, in part because of energy prices and the renewable portfolio standard in California has pushed the $.5 up to about $.10 per kilowatt hour. Of course, there are other all kinds of landfill operations and community issues that you have to deal with in operating the landfill.

One of the things we went ahead with in looking at options to flaring and landfill gas to the grid is this project that we have talked about earlier, I do not want to spend much time, but Waste Management was partnered with Linde and the Gas Technology Institute to recover biomethane landfill gas for use of transportation fuel. It is going under construction and it is going through its final start-up phases right now, and we hope to have a grand opening ceremony in early November. It is about a $15 million investment. And it is going to produce about 13,000 gallons per day of liquefied natural gas. This is bio liquefied natural gas, not fossil fuel natural gas, from the wastes that are in the landfill. It is really the largest effort to introduce on-site liquefaction for landfill gas in all of North America, and we really are interested in seeing this technology being extended and expanded to further use the landfill gas resources to replace fossil fuels as a source of the fuels we use.

Right now, we are focusing on this technology, it has been expensive, we need to go through maybe the second and third generation before we can start rolling this technology out more efficiently to many landfills throughout California and elsewhere in the United States. We really appreciate this report we have received already from the state agencies for this project. We look forward to working with the Energy Commission to see if we can get another such facility up and running in California through the AB 118 funding process.

And why do we care about this? Well, Waste Management has a 20 percent natural gas fleet now, both CNG and LNG, about 700 trucks out of our 3,500 trucks statewide in California. Landfill gas to LNG or CNG, we look at as closing the loop, it is basically when you take that waste to landfill and you can generate gas to fill up your trucks to deliver waste to landfill, and so it is on a closing the loop process that we think is really good for us and good for the state.

One of the things we are looking beyond just simply taking existing landfill gas is looking at anaerobic digestion facilities, and one technology that we are looking at among many other anaerobic digestion technologies is this idea of a renewable anaerobic composter where we have a series of pods that would be used to both produce a methane gas and produce a useable compost co-product. You would fill this pod up gradually over, say, a 20-30 day period, you would cover it with an impermeable layer, you would basically cook the waste for nine months to a year, and then once the maximum amount of methane has been generated, you would aerate the pile, remove the material from that, and sell it as a compost product. The idea, it would have maybe 10-15 of these units in a series and constantly filling up the units and emptying the ones that have reached maturity, and this would be kind of a never ending process, you would continue using these same cells over and over and over again to process organic waste that has been pre-processed and pre-sorted to focus on both the green waste and food waste.

We have three pilot projects that are just getting started and that is going to be the full ten to 12 units, or 15 units, two or three units at Altamont, El Sobrante, and Lancaster Landfills here in California, just to get two or three of these cells up and running to see how they operate, see how they generate the gas or they operate like we think what they are going to, and we certainly look to the Energy Commission to helping us move this kind of conceptual state into a commercial stage. We think they are going to be much more beneficial in terms of both producing energy more efficiently, but also producing a co-compost product that could be also sold for beneficial use.

MR. WARD: Chuck, what is the scale of those sizes?

MR. WHITE: They are about a 5,000 ton per -- I do not have the exact dimensions, I would think they were about 100 feet by 50 feet, generally, but that could vary, depending on the actual application. But each unit would handle about 5,000 tons.

We are also looking at producing a commercial grade diesel from landfill gas. We have got a plant up and running in Oklahoma, it is only about a 25 gallon per day unit, we are hoping to expand that to 250 gallons per day. It is basically a modified Fischer-Tropsche process for producing diesel directly from landfill gas. We hope to increase the size of the unit from the current 25 gallons per day to 250 gallons per day by the end of this year. If that upscaling is successful, we hope to go to a 1,000 gallon per day unit in the next couple of years. But, again, that is in Texas. We are not looking at that in California -- yet.

We also have recently formed a joint venture with InEn Tec, LLC to form S4 energy solutions. This is the goal of commercializing plasma gasification technologies where we actually take waste and apply it to a plasma art process and gasification technology to produce a syngas that could be used to either reap further process into a fuel or to generate electricity. We are just trying to see if this is at all commercially scalable at the current prices that are available for energy. We have a first project that is in Chambers County, Texas, it will be the first commercial prototype running on municipal solid waste and medical waste, and we hope to have that up and running in the next year or so.

Terrabon is something that I sent some information to you folks about, and one we are really excited about is a joint venture with Valero Energy and Waste Management to support this Terrabon process which produces a biocrude that can be refined into green gasoline and other non-fuel chemicals. It is basically a fermentation process that is used to produce a biocrude. We have got a 5 ton per day plant that is under work in Port Arthur, Texas. We hope to begin engineering on a 55 ton per day pilot facility at the Valero refinery, there as well. And we have got the right to provide first offer to supply organic waste and the first right to invest in future projects, and Waste Management will initially own about 10 percent of this Terrabon joint venture. And why do we like a Valero and Waste Management venture? Well, this next slide kind of shows, if you can see the dots, the deep green dots are where Waste Management has operations throughout North America, and the blue dots are the Valero refineries, and we looked at both operations, so there is a real opportunity here for Waste Management's existing infrastructure to feed municipal wastes and potentially other types of waste like agricultural residue, even forest residues, into using our transportation systems and infrastructure, into bio refineries that can serve the existing Valero refineries throughout North America. So we are really excited about this process. We are really hopeful that we can bring some of this technology to California, depending on how the initial performance of the scaled up process in Port Arthur, Texas works in the next couple years.

MR. McKINNEY: And then, Chuck, if I could ask, just to make sure I fully understand this, so that the organic waste streams will come from your landfill and --

MR. WHITE: Well, we would basically be taking organic waste and municipal solid waste, green waste, and putting them into a bio refinery. We are even thinking of a bio refinery site in one of our locations in the Oakland area as potentially in the next year or two, to begin to start looking at is that a possibility, and we would then divert waste that we are currently handling, and using it in compost facilities or sending it up to the landfill for disposal, or use a alternative daily cover, they would be sent to this facility for processing and conversion into this biocrude.

MR. McKINNEY: And you mentioned wood waste, and you mentioned forest biomass wood waste, as well?

MR. WHITE: That is kind of the next -- we are cutting our teeth on a municipal solid waste they are already handling, and if this process works, then the idea would be to reach out to other sources of residues that could be fed into the process to produce this biocrude. So we are really excited about it. I am not the expert on it. We are going to have one of our engineers who has been involved in this coming in to California in the middle of October and I am hoping that I can bring them back to meet and greet you folks, and he could bring you much more information on Terrabon and on our partnership with Valero to produce this biocrude.

Carrots and sticks. Well, we are looking down the road, there is this greenhouse gas thing going on, if you have not noticed, and we are one of the founding partners, founding members of the Chicago Climate Exchange back in 2001, and we began trading greenhouse gas reduction credits by landfill gas capture projects. That started off at about \$3.00 per metric ton of CO_2 equivalents, it is down to about \$1.50, I think, now. So that really has not been very robust for a whole variety of different reasons. We also had talks with the Oregon Climate Trust, now called The Climate Trust, to see if we can generate projects that could potentially, on the voluntary market, produce salable credits, although we have never been able to put something together. Their focus has been so far on forest-type projects. We are one of the initial members of the California Climate Action Registry, the first solid waste company to join that entity, and we are looking at the Climate Action Reserve for potentially generating credits. On the overall thing, we see the greenhouse cap-and-trade and potential carbon taxes as providing a real incentive to transition from fossil fuels to biofuels as we are talking about here. But unfortunately, there is a gap of about the next five to seven years, and before any real money is likely to start flowing, even though the Low Carbon Fuel Standard that takes effect this coming January, really does not kick in, in terms of generating substantial marketable credits until about 2015 on the transportation side, and the cap-and-trade program is not in California, even at most optimistic now, is not expected to develop until 2015. So what are we going to do until these kind of revenue streams are available to supplement just the simple marketability of the product to make these viable projects? On the other hand, we have also got increasingly stringent emission standards from the stationary sources I mentioned earlier, our turbines, our internal combustion engines for burning landfill gas, these rules are getting tighter and tighter, and particularly in the non-attainment areas like the South Coast. So the idea of using these fuels for stationary combustion is getting less desirable all the time, and we are looking increasingly towards transportation. I mentioned the Low Carbon Fuel Standard is still a while off.

Increased fossil fuel costs have taken a dip because of the recession, but we think that is going to be a continued increase in the future. On the other hand, the Renewable Portfolio Standard, which the Governor says he is going to increase to 33 percent through Executive Order, that creates further demand for these fuel to be used to generate electricity. And then there is always the facilities siting and permitting process. Valero, our partner in the Terrabon process, is concerned about how can we site these bio refineries. I am on a task force with the Air Resources Board to develop some guidance on bio refinery siting, and we are very concerned about how we can help facilitate the CEQA process, addressing human health and environmental concerns that may come up as a result of siting bio refineries. So plopping these things down in various places in California may be a real challenge, and we hoping that we have cooperation amongst all the agencies, including the Energy Commission, to get these facilities sited.

And the funding assistance and start-up, I cannot emphasize that enough, and I would just simply use the project that we have at our Altamont landfill as an example. It is about a $15 million project, a substantial portion of that is used to build additional and redundant parts of that refinery because we do not know exactly how the commercial side scale is going to operate, so you really want to build in flexibility. And even during the start-up stage in the last couple months, we have had to do some re-piping, change a little bit of the engineering and the specific units that have gone into that plant, and so leaping from bench scale to commercial sized projects is a high degree of risk, and there is added cost that you would not normally have to incur once you have got a project that is your third, fourth, or fifth generation facility down the road. We are still in the learning curve and, if the AB 118 monies can help provide some additional margin to allow us to get these projects up and running, that sure would be great. So, I mean, that is really all I had to say today. Any questions -- and you did want me to kind of summarize what I thought would be the priorities, and I am speaking only from Waste Management and our business partners' perspective, but we really think that landfill gas is really the low hanging fruit right now, from our perspective, because it is not being utilized, it is being collected, it is being burned, it is just a matter of redirecting that to an additional unit. So we would really encourage you to continue to look at ways that landfill gas could be converted to transportation fuels, help us with additional landfill gas to LNG projects, work with us to figure out how we can get landfill gas into a pipeline because, in addition to having LNG trucks, we have got CNG trucks. And we are not talking about putting landfill gas necessarily in a pipeline to produce energy at some power plant, we are talking about putting landfill gas into a pipeline that can be extracted as a transportation fuel. It will not be the same molecule, but it will be the same amount of molecules that we pull out of the pipeline. Unfortunately, all of the utilities, at least as far as I am aware of, I have got my friend from PG&E here and Sempra Energy, they all have rules with the CPUC that prohibit landfill gas from being put into a pipeline, and that is just kind of a legacy issue from a concern over vinyl chloride in landfill gas that existed some 10, 15 years ago, and basically on hazardous waste landfills. There really is not a problem, we think, today, and to the extent we certainly have not demonstrated the technology at our Altamont, which clearly exists to treat landfill gas to levels so you can reliably put it into a pipeline and do not have to worry about residual contaminants. So we hope this is a red herring and an issue of 15 years ago, and we can begin to try to change this page in history and be able to open up the door to putting landfill gas -- treated landfill gas -- into a pipeline and use it for transportation fuel, or, if desired, use it to generate electricity or other power sources. So landfill gas, we think, from our perspective, is really important, but second, then, is just simply looking at pulling the organics out of the waste stream and not putting it into a landfill, and using primarily anaerobic digestion, or this acid fermentation process that I mentioned using Terrabon, down the road, although they are not quite ready as part of this funding cycle, and possibly down the road Fischer-Tropsche diesel process like the Alcam I mentioned, or down the road further, gasification technologies. But immediately are ways to using anaerobic digestion to process municipal solid waste before it goes into a landfill, to see if we can be more efficient in collecting that -- efficient and cost-effective in collecting that methane gas, and using it beneficially. And then extending these concepts to Ag residues and forest residues down the road. So that is kind of our view of where we think you should be going, and we would be happy to work with you. We are really excited about the AB 118 program and we think it is really going to provide yet additional seed money to bring these technologies into commercialization in California. Thank you very much.

MR. McKINNEY: Great, thanks, Chuck. Very very interesting, very informative, and I like learning about the upcoming technologies. I did have one kind of technical question. Can you explain kind of the comparison of the emission factors when you flare landfill gas versus when you combust it in an IC engine?

MR. WHITE: Yeah, we do not have any problem meeting the standard for flares, it is just flaring the gas. It has never been an issue. The only issue is getting offsets when you flare, and when you burn anything, you have to get an emission offset, and those are getting very costly in many parts of the state. So we are -- there really is no technical problem in meeting emission standards for flares. The problem with internal combustions is they do not work quite as efficiently as a flare, and you have more incomplete products of combustion and higher NO_x levels and higher CO levels. We were basically very successful recently in working with the Bay Area AQMD. They had very stringent standards for both NO_x and CO, and we got them to allow us, when we first put a new engine in, an internal combustion engine in for generating electricity, to allow the CO level to float up slightly between engine rebuilds, and that we rebuilt the engine and the CO level goes down, and meanwhile, we keep the NO_x level at the standard. They are in non-attainment for NO_x but not in non-attainment for CO, so we got them to give us a little trade-off and so we are looking at possibly putting in more engines in the Bay Area landfills in the near future, but we are also interested in trying to see if we could take this gas and put it into a transportation fuel, which we need for our very own trucks, and be able to commercialize and sell to others, as well. Did I answer your question?

MR. McKINNEY: You did, sir. Thank you. Pete, did you have anymore questions for Chuck? All right, thanks very much.

MR. WHITE: All right, thank you.

MR. McKINNEY: Next up, we have Ken Brennan. Do you want to speak from the table or do you want to go up to the podium?

MR. BRENNAN: Whichever you prefer.

MR. McKINNEY: Why don't you go to the podium, then? We have Kenneth Brennan, Senior Project Manager from PG&E.

MR. WHITE: I have extra copies of my presentation here if anybody is interested.

MR. BRENNAN: Hello. Thank you for the time today. I appreciate your giving me a couple minutes here. Ken Brennan from PG&E. I work predominantly in the biomethane sector for PG&E. I am a Project Manager. I ran point on getting the Vintage Dairy Project going so we can take dairy manure, dairy source gas down at Vintage Dairy south of Fresno. That project was a good success for us, the gas was really good. We are looking at other feedstocks now. There is a lot I could say about that, but what I am really here today to do is to tell you about something we need, something that I can add to support what was said earlier, and answering anybody's general questions that you might have of the utilities. First and foremost, on the biomethane front, PG&E is essentially for pipeline injection projects, we are here to accept the gas. The primary criterion for accepting gas is it has to meet our pipeline specs, the gas quality tariffs that we have. So Cal gas is Gas Rule 30, PG&E is Gas Rule 21, Section C. There are a lot of challenges that we have to consider when we are taking non-traditional sources of gas. The first thing we have to look at, of course, is the gas quality. The second thing that a project developer would have to look at that would impede the implementation of one of these projects is something Kay mentioned, something that, frankly, everybody mentioned, which is lack of incentives, permitting, and also project siting.

To get biomethane into a pipeline so it can be delivered to any buyer as a vehicle fuel, what we need to do is we need to first site the project so it is near a pipeline, it seems pretty straightforward, a lot of pipelines out there, certainly there is a pipeline going next to every facility that Waste Management would have a project at, I am sure. Not every pipeline can take this gas, okay? So we need to do a lot of work with the project developers on siting. So my encouragement for any project developer working out there is, 1) involve your utilities early, SoCal or PG&E, does not make a difference, we have long lead times on equipment, electrical and gas equipment, and we need to do some engineering work to make sure that, if you are going to inject gas into our pipelines, that the pipeline can actually accept that gas where you want to inject it.

The next thing I want to talk about is for permitting. I think it was Kay that talked a lot about co-digestion, what she called mixed waste feedstocks. I cannot add on enough to what she said about the Waste Management Board -- and she mentioned one other agency, but I am not sure -- of the requirement or the specification that, when you bring an outside feedstock across a property line, you now get qualified as a landfill and you need special lining, especially for dairies. If you are going to do a dairy project and try to co-digest, once you bring in something like cheese whey or any other waste that you want to throw into a digester, you are not a landfill and your costs go up because you have to take what used to be classified as a waste, now it is classified as a feedstock, take that into your process, and your costs go up automatically. We need to get that rule changed, so if there is something that the Energy Commission can do to work with the other agencies in Sacramento to make that happen, love to have that, that would really move the industry forward.

The other thing I have on permitting is actually not a request from PG&E. Dan Pellissier, who used to work for CalEPA now works for the Governor's Office, is working on a dairy project, biomethane permitting guidance. And there was a request put out to private industry and the biomethane industry for some source funding to help that effort move through, at least from PG&E's standpoint, we are unable to contribute to that effort, no matter how much we want to, so from an R&D perspective of assisting these projects for happening, what the CEC could do under AB 118 is to call that RD&D, call that effort RD&D and try to find some funding to place towards that effort. The dollar amount we are talking about is $750,000 for that. This, the Government can fund the balance of that project, which I think is like another quarter million or so, but they need $750,000. That will be a worthy cause, and what that would do is that would trim the permitting time for digester projects, dairy digester projects from about six months or more, down to about one month or two. So that can facilitate a lot of these projects happening in the Valley.

Okay, now, what I am going to spend the most time on -- gas quality. Everywhere I go, I talk about gas quality. We have talked about a lot of feedstocks here today. I talk to Project Developers literally every day of the week. The gentleman that was here that has spoken before the Commission, but not yesterday, Jim Tischer, who was trying to work in Mendota to get a project up and running based on sugar beets. Mendota has a 41 or 42 percent unemployment rate, so it dwarfs the 25 percent we heard about earlier. Okay, we need projects like that to happen. Right now, PG&E cannot take that gas because we have not tested for it. Every feedstock that we need to look at, whether it is agricultural waste, waste water, food waste, up to and including landfill gas, we need to test for that feedstock to make sure it is safe for our customers and pipelines. No matter how much we want to take all this into our system and be the green utility, as does SoCal Gas, we have one charter, and that is to protect our pipelines and customers, and not necessarily in that order. So, for the pipeline perspective of the business, we have to look at every one of these non-traditional feedstocks and make sure they are safe to put into our pipelines. Above all, that is the main thing that we have to do. So what does testing mean? We have an initial body of research that we have to do. Before we are able to even start some physical testing, we have to do a whole block of research on whatever feedstock we are talking about. So that is probably going to be a large chunk of money. I am sure a lot of that work is already done. Maybe we can cut those costs down. Academia has done a lot of work, wastewater plants have done a lot of work and they are all biogas, companies like Waste Management have done the same, they know it is their own biomethane coming out of their landfills. We need those data. Okay? Whatever data is not in there, we have to go looking for. All of that costs money. The second phase of gas quality testing is we have to do an initial testing of what comes off of every project, test the raw gas, see what is in it, see if it matches the academic data that we can find, and then we have to test what comes out of that after it is cleaned up. So what we are trying to do is we are trying to get a list of constituents of concern that we have got to mitigate before those constituents hit our pipelines. It is just that simple. The third step in that is we have to do ongoing testing, but that is a matter between the project developer and PG&E. So those three phases of testing. The question that is always out there is who is going to pay for this. And the answer is real simple. From the utilities' perspective, both PG&E and SoCal Gas, we go through a rate case about every three years, it is supposed to be every three, SoCal seems to be every 10, give or take, because they are luckier than we are. PG&E goes for a rate case every three years and we are allocated a certain amount of money for items like gas quality testing. To do dairy, we spend three times the amount we meant to spend, or we were allowed to spend, and that came off other projects and out of PG&E's pocket. We have a lot of constraints right now financially, we have got a lot of things we are trying to do with the limited funds that we have dedicated to the pipeline side. Gas quality testing funds are exhausted, so we cannot move forward with our testing program. So right now, we are happy to take manure gas all day long, but we cannot move forward. So no matter how much we want to do this, we are stymied and we cannot move forward. We need a body and we need some money to do this testing.

So the question comes down to who is going to pay for it. It is either going to be ratepayers through another rate case in the future, or it is going to be the Project Developers, or whoever owns the particular project. That is pretty much it on the gas quality testing.

The summary of all this that I really meant to say today is that we cannot move forward on anything we have talked about today, getting gas into pipelines through everyone of these projects that wants to buy it and use it to make the vehicle fuel, we have to do the testing. So what PG&E would ask out of the Commission for AB 118 would be that you have some amount of money in there for RD&D related to biomethane research, where we can take some of that money and test gas that is going into our system. What do you get out of this? It is great to just give away money all day long, everybody in the state is coming to you with a project, everybody is saying to you, "Here is the best possible use of your money," but what are you getting out of this if you give money towards gas quality testing? What you are allowing to happen across California, and it is not just PG&E data, it is going to be SoCal gas data, it is all going to be shared because public money is public data. What you are getting out of this is a bunch of what I call template level projects where, it is not one project here, one project there, we can replicate projects all across California. Once we test for Ag waste of whatever family of Ag waste it happens to be in, we are pretty good on that gas, once we test items like food waste and waste water, we can move forward on those projects, too -- all across California. And we know the gas is going to be safe. You do not have to spend money for PG&E, and then again for SoCal Gas, STG&E, Southwest Gas if they move forward. Spend money one time and we share the data. So that works.

MR. McKINNEY: So you are saying that for classes -- say for different classes of feedstocks and it is kind of one standard test that can be done, and then if you are short of parameters around the state for those different sources, that that would satisfy the testing concern?

MR. BRENNAN: I guess engineers are never going to be satisfied. That is rule 1 with those guys. Again, I have to wear two hats at PG&E, one is I need to be my gas transmission hat where I protect our pipelines, and the other is the environmental guy. From the gas engineering perspective, we have to be sure of every project, every feedstock, so in time we will become comfortable with this gas, but every new feedstock is something we need to test. Once we get comfortable with it, we are not going to have to test every feedstock all the time, it is just a matter of gathering data on something that we have never seen before, and once we get those data, we can get a protocol established and just move forward like it is any other type of gas coming to our system.

MR. McKINNEY: And are there kind of rough ballpark cost estimates for this type of testing?

MR. BRENNAN: Very rough?

MR. McKINNEY: Sure.

MR. BRENNAN: And you are not going to hold me to any of them?

MR. McKINNEY: No, it is on public record, but other than that….

MR. BRENNAN: Oh, Lord, here we go.

MR. WARD: There is just us here.

MR. BRENNAN: Just us, nobody is -- okay, I would say the initial body of testing is going to run somewhere between $5-700,000.

MR. McKINNEY: Is that per feedstock?

MR. BRENNAN: Per feedstock. And the testing of the raw biogas, I am taking a guess because we have not talked about this number, but I would say probably $50 per sample. And the upgraded biogas, I can tell from personal experience, is about $20. So as you can see, this stuff is not cheap, so we want to gain this knowledge and then, as time goes on, and we see this stuff more frequently, which is what we hope to see, then we are not going to have to do as much testing. But it takes money to get started. It is the same thing everybody else is saying here, we just need the testing to start, and then we can move forward with it.

MR. WHITE: Chuck White. Is this testing -- you said $500,000 to --

MR. McKINNEY: Could you turn your mic on, Chuck?

MR. WHITE: Oh, sorry. $500,000 to $700,000 per sampling --

MR. BRENNAN: That is ballpark --

MR. WHITE: -- regime for a particular source of gas?

MR. BRENNAN: Say for landfill gas, let's say the Hayden's Act gets changed and we start moving forward with the testing regimen. It is going to take about that amount just to get the ball rolling, because what we have got to do is we have got to say, okay, what is in this gas? All right, there is a body of data out there, but each and every landfill is going to have, in effect, a different feedstock. Now, we have to go with that concept until we are sure of consistency of data. I mean, if we get the same data across the board, every landfill we are testing --

MR. WHITE: Is this cost because of multiple samples that have to be taken over a period of time, or just simply the suite of chemical testing is so large that it is expensive just to run a single test?

MR. BRENNAN: Yes to both. We have to test it over time and we have to test physically. So you can see it is not cheap. It takes money to do this kind of thing, but we are willing to do it.

MR. WARD: I have a question in regard to the AB 118 funding you mentioned. If we were to consider this type of a cost, what is PG&E willing to do as far as using the gas for transportation? I know you folks have a history of tapping into the pipeline into the liquefaction project right here on 4th Street, I think, those five in Sacramento, but I think that is more of a true transportation play and putting it in the pipeline, what is the assurance that it would be used for transportation? That is my first question. The second one is, is the feed-in tariff to do wheeling, to take that gas, in theory, out to some other place around your pipeline structure to be used for transportation? See, there has got to be a hook for transportation -- AB 118 funding, that is kind of what I am getting at.

MR. BRENNAN: Okay, well, the initial question you had, how do we get the gas from point A to point B and make sure it is being used for the right purpose? Chuck actually already gave you that answer. What we are going to do -- but the system is actually very simple -- PG&E has the ability to accept the gas into its pipeline, okay? We will ship the gas to whichever party buys that gas, it does not have to be PG&E, we just happen to get lucky and successfully negotiate for the two biogas contracts. You can sell the gas -- when you do a project, you can sell the gas to any willing party for whatever reason, whatever purpose, and we will ship that gas. It is not the molecules, it is the accounting of the molecules. So in other words, from where I am standing right here, if we have a pipeline that is heading up north to Colusa, but you have a customer you want to sell the gas to, that is down south in Lodi, pick a city, just do the accounting for it. The gas gets nominated through our pipeline system running to Lodi. So it is very very simple to do.

MR. WARD: Okay. The second question?

MR. BRENNAN: The second question is --

MR. WARD: What is the tariff for wheeling?

MR. BRENNAN: I do not know that there is a specific tariff for it, per se. But, again, same concept. You can sell to any customer and the gas can end up anywhere on the system.

MR. WARD: Okay, I think part of my concern is that, if we were to help fund the gas characterization and testing of this, and that is quite a bit of money, what is the assurance if you are not going to use it just for generating wheelable energy?

MR. BRENNAN: Well, that all depends on the negotiations between the entities selling the gas and whoever ends up buying it. As I said, PG&E is only here to ship the gas. If we end up buying it through a negotiation, that happens, and I cannot guarantee that that is not going to happen. But if you have a project that is specific for injecting gas and being sold directly to a facility that is going to make vehicle fuel, it is guaranteed. So it all depends on the end user.

MR. WARD: Right. Now, you have the regulation to come up with renewable electricity. Does that -- I am asking this question, truly, does that then bid up the price to make it prohibitive for transportation use, do you think?

MR. BRENNAN: Given the price of natural gas right now, being as low as it is, I cannot sit here and speak for -- let me explain something before I keep talking -- I am on the transportation side of our business, I am on the pipeline side, I am a gas guy. The side of our company that deals with the purchasing for RPS compliance is the Energy Procurement side, and they are separated by a regulation by the CPUC. Our guess is Rule 26, I think it is, so the two entities are separate. That being said, the price of natural gas right now is very low, and with all the pipelines being built on the gas plays that they keep finding, which is making my job very difficult, by the way, the price of gas is not projected to go up at any point in the future, real soon. So the way we do the contracts is based essentially on a term number of years for a contract. So if the price of gas on, say, a 10-15 year curve is still low, the better value is on the transportation side, anyway. So the economics work in favor of doing one of those projects. I cannot sit here and guarantee you that someone is not going to outbid at the vehicle fuel project, but the entity developing the biomass project for the purpose of a vehicle fuel, a station, a rack, or whatever it happens to be, that could be a guaranteed straight shot into that customer.

MR. WARD: If we were to fund some of the testing, is PG&E a potential buyer of this gas to be used at any of your transportation fuel stations, do you think? I think there is an underlying commitment there because I have seen that PG&E has a little bit retreated from the transportation fuel area.

MR. BRENNAN: Yes, we have. I cannot speak directly for that area, so that is not what I do for a living, but I have seen that retreat, as well.

MR. WARD: Okay.

MR. BRENNAN: It is my understanding that we are looking at electric vehicles and that most of our fleet is CNG at this point, and we make that ourselves. We do have some LNG trucks, I know that much.

MR. WARD: Thank you.

MR. McKINNEY: I do not know if you can answer this, Ken. But to follow-up on what Pete was getting at, so say for example you have got a dairy in the valley and there is a bio refinery, they are existing, or going in, and they want to do a bilateral contract, do they have to meet the same gas quality specs that you are talking about for your pipeline safety and quality assurances?

MR. BRENNAN: Sure. All gas going onto our system has to meet our Gas Rule 21 Section C, does not matter where it is, you know, it is across the system, you have to meet that spec. Also in that specification, is a line that gives us some freedom to test for whatever is specific for those feedstocks, so, yeah, they have to meet that quality tariff, plus whatever else we deem to be a problem, or an issue that we do not understand. Let us say, for example, you have a project and some particular matter goes through, or some microbes come through that we did not know existed before because we had never seen them, we have to address that, and so that is also covered, I guess, by tariff. Everybody has to abide by that.

MR. McKINNEY: Okay.

MR. WHITE: This is Chuck, if I may. It is a little bit like the chicken and egg situation because, if you are going to invest in a process to treat landfill gas other than maybe a small bench scale, you really will not know what the quality of gas is until you have actually built the entire plant. So how am I going to be able to invest in the construction of a plant that is designed to put treated landfill gas into a pipeline if I cannot protest it through your almost a million dollar process, until after I got the plant built? That really puts a huge disincentive for me to invest much money in that, and I will just stay with producing LNG.

MR. BRENNAN: It is a quandary. Again, we have to fallback on the concept of we do not know what is in these landfills, and we have to protect the pipes. With a body of data, if all of those data are saying the same thing, same results, same constituents of concern, then we will probably be okay, but we still have to test it.

MR. WHITE: The Hayden Bill itself does not prohibit landfill gas, it just simply says it has to meet a certain standard for vinyl chloride and I have never seen landfill gas from our own testing that even comes close to that vinyl chloride standard. But you are not only concerned about vinyl chloride, you are concerned about the myriad of other constituents, I do not even know what they are, but I guess --

MR. BRENNAN: Neither do we.

MR. WHITE: So if we have to look for -- you cannot prove a negative kind of thing, huh?

MR. BRENNAN: Exactly. We spent a lot of time, effort and money, and most of my life for nine months, trying to figure out the gas quality for Vintage Dairy. It was very very expensive. You add in my time to the cost of the actual physical testing? It was extremely expensive. I wished they would add more of my time in there.

MR. WHITE: And is this coming from CPUC rules, primarily? Or from your own liability as a corporation concerns, if I can ask a frank question?

MR. BRENNAN: Frank questions are good because hopefully you can get frank answers. I would say both. The CPUC is not just here to regulate utilities, it is also here to keep people safe, so at the end of the day, we have to live or die by what is in our gas quality tariff, so it is a rule of operation, but it is also something we can use to protect our pipeline system. Now, as I mentioned, there are a lot of constituents of concern that we know nothing about because we never had experience with this gas. We know about California production gas, we know what is coming in on the big truck lines coming in from Canada and from the Southwest, we know all that stuff because we have been doing it for 100 years. But at the end of the day, this is all new stuff and we do not want to have some pipelines get eroded through, or somebody gets sick from their coke in their house, and you do not want that either. If something is wrong with one of these projects, it is going to shut the industry down. If you do one project and it eats up any pipelines, do you honestly think we are going to do a second project?

MR. WHITE: Oh, I am not arguing, I agree.

MR. BRENNAN: That is why our concern. We want to make this work, but we have to do it methodically and step by step.

MR. WHITE: Well, I think he raises a great idea of having some kind of agency support for an evaluation of this whole issue of getting biogas into the pipeline. I mean, I think your PIER group had a meeting about a week or so ago, and I approached them, saying can the PIER group, through its research arm of the CEC, evaluate this dilemma in some kind of study or report, I do not know if PIER has a budget of $700,000 per sampling regime, but there needs to be some kind of evaluation of this problem because, frankly, we would like to use the infrastructure that already exists in pipelines to be able to distribute the gas as use for transportation fuel if it is at all viable, but we are not in a position -- we know if the door is closed to us today, we would like to just figure out if that door can be opened, but we certainly do not have the key to that door ourselves.

MR. BRENNAN: And what we would be asking from the Commission on AB 118 would not be for every feedstock at the dollar amounts I mentioned, which I am going to state again, I am not sure that they are 100 percent accurate. We have certain projects that are likely to come down pretty quickly, and if one of those feedstocks happens to be sorghum, we will test that first; if it food waste, we will test that second. The order that we do our testing in is really project dependent. You have got a number of projects coming down the pipe on, you know, municipal food waste, or waste water, or sorghum, or whatever, we will start testing that first. So we are not going to ask for $50 million so we can do all the testing we need to do, that would be, I think, a little bit unrealistic. But what we can do is try to facilitate these projects quickly so that we get some fuels hitting the system.

MR. WARD: I can see there might be a ratepayer benefit here. Is there a way you can rate base any of this expense, or no?

MR. BRENNAN: I know the CPUC is looking at different aspects of the biomethane industry, I have not seen a rulemaking issued, I have not even heard of one being developed yet on rate base and gas quality testing. There is a societal benefit to doing so, I agree. That takes time. It is 18 months to litigate something at the CPUC from start to stop, and that does not include bifurcation of the proceedings, which I am sure Chuck knows all about. That all takes time. I was in the gas capacity at OIR in 2004, I think it was, and it was almost 2.5 years, or longer, so if we could get jump started and then work on the rate basing at some other point in time, the CPUC does the ratemaking, that can certainly happen. So we do not have to constantly be coming back to you for money, we have got the rate cases coming up, we have got some potential for rate basing the stuff at the CPUC if that happens, but for right now with the immediacy of the projects that we want to get done, and you want to get done --

MR. WARD: How many of these regimes do you contemplate, just like a ballpark, and I appreciate your candor here, too, because you have given us something kind of off the cuff, and I do not know if Jim wants to --

MR. McKINNEY: No --

MR. WARD: How many regimes do you anticipate at this $500 to $700,000?

MR. BRENNAN: By regimes, you mean feedstocks?

MR. WARD: Uh huh.

MR. BRENNAN: Depending on the complication of the feedstock, one to two. In other words, if we have simple feedstock like an agricultural project, like maybe sorghum would be cheaper because it is something that we eat and it cannot be all that dangerous. That would differ greatly from something like a waste water project where, frankly, you can put anything in the toilet from what you normally would use it for to medical waste, and anything in the middle. So depending on the complexity of the feedstock, the number is going to differ.

MR. WHITE: This is Chuck. I still come back to the problem of feedstock is one thing, but you have got to come up with the actual feedstock that you would be proposing to put in the pipeline and that does not even exist today with respect to landfill gas because, I mean, we could take the output from our LNG plan up at Altamont and we would show that there is probably very little contamination of any that would cause you any concern, but that would not be realistic because we would never be putting that gas into a pipeline, it would be some other treatment regime that does not even exist. So we would have to build the treatment unit to generate the gas to put it in for testing, not even knowing whether or not it would be acceptable. We would have to basically bet on the come that it would work.

MR. BRENNAN: This is new turf. If it was traditional gas, it would be easy.

MR. WARD: And there is one other question. You mentioned a $20 and $50, are those sample costs?

MR. BRENNAN: The $50 was a number that I estimated.

MR. WARD: Fifty dollars?

MR. BRENNAN: Fifty thousand.

MR. WARD: Fifty thousand, of course.

MR. BRENNAN: If it was fifty bucks, I will pay for it myself. Roughly $20 to $25,000 is what we paid, in fact, I think it was $20,000 or $22,000 for the dairy samples. We have done several of those right now, the data are consistent. So on a monthly basis, that is what we would be looking for on those projects until we get a history of them.

MR. WARD: What I might suggest here at this point is, we are interested in this information and if you could provide this in written form to our docket as a partnership with PG&E and others, maybe Chuck and others, we could join with a partnership to do something like this. I think that would maybe have some appeal and we would like to hear more about that.

MR. WHITE: I mean, I can see the interest in Waste Management and Linde and PG&E and CEC and maybe even CPUC kind of all five of us getting together and figuring a way to test the landfill gas. We could use some bench scale testing that Linde probably has available to at least approximate the kind of treatment process that we would be using before putting it into a pipeline and see if we can come up with something that would work. But, I mean, I am just thinking out loud right now.

MR. BRENNAN: I would love to be so high up in the hierarchy that I could say, "Sure, we'll do that." It all depends on the gas quality engineers. So whatever we are going to do, I am going to have to run it up the hierarchy and see what the process is going to be. But at the end of the day, renewables are important, so we are certainly looking at all options and that is out there. A lot has to change before we look at landfill gas, a lot of -- I am going to go back to the testing we need to do.

MR. McKINNEY: So, Ken, when you were talking about the Vintage Dairy and the amount of time and the amount of money to test that feedstock, so now you have got that data, you are assured that that particular operation meets your gas quality standards, how replicable are those test results to other dairies in the state? I mean, do you have to go to that same level of testing again? Or do you drop down to the next tier, what was it, like the $50,000 or $20,000 tier?

MR. BRENNAN: No, we are just going to do normal standard testing for the other dairies. We do not have to recreate the wheel on that. That is the beauty of doing the initial body of testing. If you do the initial testing and you do the follow-up subsequent testing, and it is all the same stuff, you can just assume that that is going to be your bottom line court.

MR. McKINNEY: So Ken, I understand from Pilar that we have a comment by WebEx, is that correct? Do you want to open that phone line, please? Could the speaker identify themselves?

MR. EAVES: Uh, yes, this is Mike Eaves with Clean Energy in Seal Beach, California.

MR. McKINNEY: Hi, Mike.

MR. EAVES: I just want to comment on the issue of trans -- putting the gas into the pipeline and transporting it. We have a landfill in Dallas, Texas, and we inject that gas into the local distribution line, and we pay transportation fees to the California border, and that gas is sold to Sacramento, to SMUD, for power generation. And the way we envision it is that whoever is the owner of that gas, whether Clean Energy or Waste Management, they get to sell that gas to whoever they want. In our case of clean energy, while we are selling it to the utility, we also have the option under the Low Carbon Fuel Standard to nominate that fuel to any of our fuel stations in North America, we have got about 180, so if we want to put low carbon fuel into California, we pay the transportation fees to get it to California, and then we can nominate that between any one of our stations, as long as from accounting practices we do not sell more landfill gas than we have actually generated, so there is an accounting deal that has to take place, but you can sell it to specific customers. The other thing that I was interested in on PG&E on the gas testing is that we have been involved with a number of entities that provide gas clean-up technology for landfill gas, business, and for refinery gas business, and you know, some of those companies have taken samples out of their processed gas at landfills and have tested that and compared that with local pipeline gas, and in most of the instances that I have seen for some membrane technology and for some pressure absorption technology, the actual samples out at the gas processing plant are cleaner than the pipeline gas, so I would caution all that there ought to be some quid pro quo on this gas testing that the pipelines have to demonstrate that they also do not have any of these constituents they are so worried about from places like landfill, that we are not setting a double standard, where pipelines have the greater percentage of contaminants than maybe the injection stream is.

MR. WHITE: Mike, this is Chuck. What kind of process did you go through with the pipeline utility in Texas to get this treated landfill gas introduced there? Was it the same kind of testing --

MR. EAVES: No, there was absolutely none. In fact, that is the thing, is that, you know, California utilities -- you can inject gas from outside the state and send it in to California, but you cannot put it in the pipeline in California, so you know, that is -- we had absolutely no testing that we had to do. We are probably 96 percent methane, 96 or 97, with the rest of it being nitrogen, or oxygen, or inerts. And so it is pretty clean gas going into the pipeline in Dallas, Texas.

MR. WHITE: You had a pressure swing absorption unit there. Is that right?

MR. EAVES: We have a PSA, yeah.

MR. McKINNEY: Okay, well, one of the things we really wanted to do with this workshop is identify issues that we need to work here before we can tap some of these waste streams. So --

MR. BRENNAN: Jim, could I throw one comment back to clean energy?

MR. McKINNEY: Sure.

MR. BRENNAN: We do not necessarily view dilution as being a good solution to pollution, so at the end of the day, we are going to do the testing we need to do.

MR. EAVES: Well, I recognize that and I recognize there is a lot of dilution issues within state gas producers that produce very high amounts of C2 and C3, C4 components, but I think if we are talking about subparts per billion, that is a whole different dilution impact than the in-State gas producers. And like I say, you have not -- utilities have not demonstrated that they do not have some of those components in their gas already.

MR. BRENNAN: Well, Mike, at the end of the day, all we need to do is make sure that the pipelines are safe and that the customers are going to be safe, so --

MR. EAVES: I agree.

MR. BRENNAN: Once we do the testing and we get experience with the new different types of gas, then these problems are not going to be there, but it is a question --

MR. McKINNEY: I am going to suggest we close out this discussion here, I think we have really heard from all parties, and I think it is a very good discussion. Ken, I really want to thank you for coming in. You obviously prepared, but you did not come prepared with a PowerPoint, and you have been candid and taken some risks with your comments and we really really appreciate that, so we look forward to --

MR. BRENNAN: I will probably pay for it.

MR. McKINNEY: So we look forward to working with you. Again, you have identified a good tough set of issues and you have obviously sparked a lot of interest, so, again, we look forward to those future discussions. And Don and Red (phonetic), I hope you took a lot of good notes this afternoon. And, Mike, also I want to thank you for sticking around and extending your schedule, you had a very informative presentation, as well.

MR. WHITE: Chuck.

MR. McKINNEY: Chuck. I am getting tired.

MR. WHITE: That is all right.

MR. McKINNEY: I am seeing a lot of names today. Sorry, Chuck.

MR. WHITE: No worries.

MR. McKINNEY: I would like to move to the last session of our workshop, which is public comment, and we probably used up a lot of our informal discussion time already. Again, I know Tom Fulks, you wanted to make a comment on behalf of Neste and if anybody else does, they could raise their hand.

MR. FULKS: Yes, thank you very much for being so patient and putting up with so many comments the past two days, I really appreciate it. What appears to be the very last speaker, I will be very brief. And the good news is that I will not, on behalf of Neste Oil, be asking the CEC for any money, so if that gives you a little ray of sunshine, so be it. My name is Tom Fulks. I am here --

MR. McKINNEY: Well, you can ask us to define renewable diesel? I think that is what you were concerned about last year.

MR. FULKS: Renewable diesel is the same issue, and what I am doing today is giving you an update on behalf of Neste Oil in terms of things that the Energy Commission may not know, and at the end of this, which is just going to be a couple of minutes, we are going to offer a couple of what we consider to be helpful suggestions on targeting the limited resources that you have. For example, just -- we just sat through an hour and a half of discussion on a fuel that may or may not be directed at transportation, and so we are going to be making some suggestions about how to focus.

So what we would like to make you aware of is that Neste Oil is currently producing -- Neste Oil is one of the largest, if not the --

MR. McKINNEY: I am sorry, Tom. Could I ask that the folks with the side bar conversations, if you could step outside in the lobby, please, so we can hear Mr. Fulks.

Thanks.

MR. FULKS: Thank you. Neste Oil is one of the largest, if not the world's largest buyer of feedstocks for liquid fuels. And so it has an acute interest in what happens in the state of California because it has a goal of creating a refinery in the United States, its preference is California, in the investment for each refinery is upwards of $800 million, so anything that the CEC -- oh, sure, we will come in, we will ask for some money, we will take it, but the success or failure of a refinery from Neste Oil will not be predicated on the CEC funding, so I am sure you hear that as a relief, as well. Right now, one of the refineries that the CEC is operating in Unit 1 produces 53 million gallons per year of renewable diesel fuel, which is second generation renewable diesel fuel, I am sure you are familiar with the technology, so I will not repeat that. The second unit opened in June of this year, is producing another 53 million gallons a year. The refinery that is under construction and soon to be completed in Singapore will be producing 250 million gallons per year, and there is another refinery that is scheduled for completion in 2011, that will be producing another 250 million gallons per year.

The point of bringing all this up is that Neste Oil expects to have fuel for delivery to California next year, the next calendar year, and this is 100 percent renewable diesel fuel that meets all the quality specifications of ASCND975, which is petro diesel fuel being used in Number 2 in California today. Another one of the helpful hints we are going to be providing to you is to make sure you focus on fuel quality because it is one thing to be able to produce fuel, it is another to have a fuel that is acceptable to engine manufacturers and, under the hat that my company wears is for engine manufacturers, and there is acute concern, at least on the diesel end of things, about the quality of fuel.

Right now, Neste Oil is working on and is spending a great sum of money to remove its processes out of the food chain by 2020. And this would involve such things as algae oil to trope [phonetic] and so forth. Neste Oil is working on third generation processes that use forest waste products and other cellulosic biomass for diesel fuel. One of the big concerns that Neste Oil has at the moment in the United States, that has caused Neste to postpone its siting and construction plants for a U.S. plant is partly due to the economy, there is no question about that, the fuel prices being what they are, have already sort of taken a big hit on the bio world as it is, but what Neste considers to be the larger concern is uncertainty over some of these political questions that remain to be answered, namely the RS2 regulations at the federal level, will they be replaced by cap-in-trade? The Senate just announced -- Senator Reed just announced today -- that the Energy Bill will probably be put off until 2010, so the entire industry was waiting for the U.S. Government to make some determinations on what it wants to see in the Energy Bill, so it is nothing to do with California, but it has a great deal to do with the industry and what it does in terms of producing the biofuels that California says it wants. And then, of course, there is always the indirect land use component that must be dealt with, and that Neste Oil is doing everything possible to comply with support, or whatever, but given that we still have a lot of theory that some policy is being based on, we would definitely like to see this theory turn into some hard peer reviewed science so that folks like the Air Resources Board and yourselves can have some solid ground underneath you when you are coming up with decisions predicated on indirect land use numbers.

Neste Oil is fairly comfortable at the moment with what is happening in California with the -- I am having a mind blank here -- with what the ARB is working on --

MR. McKINNEY: LCFS?

MR. FULKS: Yes, yes, sorry. I have been listening to words all day long and I am just spacing out at this point. Neste Oil would like to encourage everyone to keep an open mind on the scientific indirect land use as the theory develops into, as I said, peer reviewed data. As some of you know, Neste Oil has been added to the Dow Jones Sustainability World Index and awarded the Best in Class recognition for its social accountability by store brand. The company is also featured in the Ethical Pioneer Investment Register, included in Innovest's Global 100 list of the world's most sustainable corporations, so when Neste Oil talks to you about indirect land use in numbers, and so forth, it is not because it is trying to wheedle or get out of anything, it is trying to say, "Look, the company does know what it is working on." We are some of the world leaders in this area, and it is more or less stipulated by everybody that we still do not have solid science underneath this yet, on this. And so, please, bear that in mind when you are doling out money for projects. It would be great if we could get something solid on that.

With regard to third generation fuels, Neste Oil is working with Stora Enso in Finland on -- Stora Enso is one of the world leaders in forest industry sustainability, and it produces a great deal of wood waste, and it is basically working on commercializing production of biocrude from wood waste and cellulosic materials.

So, given all that, that background, we have a couple of suggestions on how to target the AB 118 limited resources. As I said earlier, please try to stick to projects that are going to result in wheels turning on the ground for transportation, so that there is no doubt about that, you know where your money is going, because there are plenty of other renewable portfolio standard requirements of some of the other players who have been through this room in the past two days, and there may be some tangential relationships, transportation, and there may even be some direct. But there is always the risk that your transportation funds could be bled off into other areas where there are other resources, and so we would just suggest really zeroing in on transportation projects because that is where you are going to get the most bang for your buck out of that. Number two, and we have heard this before in terms of permitting and siting of facilities, and so forth, we would really suggest -- way may even come in with an application for this -- is putting together a guidebook for local regulators in terms of some of the science and some of the issues that need to be addressed by people trying to locate refining facilities because the rules that apply to these facilities vary from area to area within California, you have got Regional Water Quality Control Boards, you have got the State Water Quality Control Board, local Air Districts, and then, of course, local Planning Departments, whether it is cities or counties, or whatever it is, and often times some of these agencies, particularly in the water area, these agencies are not as current on the science as Air Resources Board is, or as the CEC is. And so it would be very helpful to sort of put together a template approach to permitting so that everyone is singing from the same sheet of music. And even if this means the CEC going to the Legislature and saying, "We want to issue a decree that permitting agencies must follow this template," that would be very helpful because, again, once you pass through the ARB level, or even the AQMD level, it is anybody's guess in terms of what is the next issue that is going to present itself to people who are trying to invest in these facilities. So it would be great if somebody at the CEC, in particular, could sort of take the lead on educating the permitters in terms of what it is the state is trying to achieve, because often times at the local level, the local folks could not care less what the state's policy goals are, could not care less what the state's energy policy goals are, it has got its own requirements to meet, and that is fine, we are not saying you serve local control, what we are saying is help the local folks by providing them with the knowledge that they may or may not have when it comes to permitting these sites. It is very important to folks like Neste Oil, in particular, because of the cost of these facilities. As I said, when you are looking at an $800 million investment, you really do want to do what you can to 1) minimize your risk with knowing there is no guarantee that it is risk-free, but 2) all these add-on costs that, once you get into something you cannot get out. It is like a change order for building a house, you know, once the general contractor has got you, he has got you. And the next thing you know, your costs are going through the roof, literally, and there is nothing you can do about it. And that is really the issue with permitting these refineries. So with that, I will let you go about your day. Thank you very much for your patience. I definitely appreciate it.

MR. McKINNEY: Thank you, Tom, very much. I am curious, what are the feedstocks for the Finnish plant? I mean, I imagine Singapore is oil palm, but is it the same for the Finnish units?

MR. FULKS: Well, NE_x BTL, Jim, is a product that can handle just about any vegetable oil or animal fat, so it is not -- these refineries are not limited to Palm, although I am sure you know the market, the price of the feedstock dictates what the refinery will be using at any given point, so right now Palm is the predominant feedstock in Finland, and more than likely will be the predominant feedstock in Singapore. Now, we are very -- acutely sensitive to many of the environmental and indirect land use issues associated with Palm, and so what Neste does not want to do is bear the responsibility of being the defenders of Palm as a feedstock, you know, worldwide. Neste will be happy to justify its own palm environmental practices, and it will be happy to report publicly and through third party validation its feedstock purchasing practices in terms of the numbers, in terms of the carbon that is emitted by its suppliers, and so forth. The reporting of all of that is open and Neste welcomes inspection of that data. But it will not be responsible for answering for the entire palm industry.

MR. McKINNEY: Yeah, and I think at some point, you know, Jackie and I and others will be very interested in sitting down with you and kind of learning more about the chain of custody practices you have with the plantations in Asia and elsewhere to kind of see how you guys do business that way.

MR. FULKS: Actually, we would like to do that because Neste believes it has the best practices in the world in terms of the requirements it has of its suppliers, and suppliers have been kicked out of the supply chain by Neste for saying one thing and doing another. Neste's requirements are very rigid and they are enforced very strictly. So if someone were to come to Neste and say, "Can we examine your practices?" Neste would say, "You got it. Would you like to use it as a model?" Because, really, Neste is bearing the brunt of everybody else in terms of feedstock use practices that may not be up to Neste's standards.

MR. McKINNEY: Okay, well, thank you very much, Mr. Fulks.

MR. FULKS: Thank you.

MR. McKINNEY: Thanks for hanging around all day and making some good comments. I appreciate it. With that, unless there is any other public comments, I think we are about ready to adjourn our two-day workshop. Pilar, are you getting something?

MS. MAGANA: No, but I just unmuted the phones to see --

MR. McKINNEY: Okay, so the phones are unmuted. If we have any closing comments? Once, twice, okay, I think, Leslie, we should close the meeting. And, again, thanks everybody for wonderful sets of comments and information for this phase of the AB 118 Investment Plan.

MS. BAROODY: Yeah, I just want to remind people that any comments are due to the docket by September 23rd, so we would appreciate any more input. Thank you very much for a wonderful workshop.

(Whereupon, at 4:23 p.m., the workshop was adjourned.)

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REPORTER'S CERTIFICATE

I do hereby certify that the testimony in the foregoing hearing was taken at the time and place therein stated; that the testimony of said witnesses were reported by me,
Certified electronic court reporter
and a disinterested person, and was under my supervision thereafter transcribed into typewriting.

And I further certify that I am not of counsel or attorney for either or any of the parties to said hearing nor in any way interested in the outcome of the cause named in said caption.

IN WITNESS WHEREOF,

I have hereunto set my hand this 24th day of September, 2009.

Peter Petty
CER**D-492