CALIFORNIA BIOMASS COLLABORATIVE

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CONSIDERING THE NET ENVIRONMENTAL AND SOCIAL

BENEFITS OF BIOMASS ENERGY

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P R O C E E D I N G S

8:35 a.m.

DR. KAFFKA: Nice spring day in California for our biomass meeting, I'm glad to say. My name is Steve Kaffka, and I have the honor of being the director of the California Biomass Collaborative following in the very able footsteps of Bryan Jenkins, who's largely towards the back now and gets to be a participant and enjoy the meeting.

I hope that you will find this a worthwhile and enjoyable meeting, as well. We're taking on what I think is an important and difficult topic, which is trying to assess the net benefits of -- environmental and social benefits of using biomass energy. It's a very big topic.

We'll have, I think, a lot of very interesting presentations around various aspects of this topic today.

Let me first say something about the California Biomass Collaborative for those of you who don't know too much about it.

You can see here the website on the screen at the bottom. This was working earlier, there it is, okay. Pretty far, actually, pretty small, so I guess we'll use that. So here's the website. Everyone is welcome to become a member. It's very easy. All you have to do is log on and sign up for the Biomass Collaborative.

And there's several aspects of the Biomass Collaborative's work. We consider ourselves a statewide biomass coordinating group. And that's really the function of today's meeting and tomorrow's meeting, is to solicit your input, to try to integrate inputs from diverse points of views, from diverse voices. And to try to help both suggest policy and create programs that favor the development of biomass.

We have a database that you have access to when you sign up, which is the facility's reporting system. We do biomass resource assessments. We do technology assessments. We do these kinds of planning functions and forums. And we work very closely with the bioenergy interagency working group, which you'll hear about in a little while. So, there's a number of functions that are important that we try to take care of.

The meeting is organized into four parts. The first two parts today will provide a kind of an overview of where things are with state policy. I'm going to try to talk a little bit about some ideas about what we might think about when we discuss net benefit in the morning.

And there'll be time for some discussion after each speaker speaks, and also perhaps at the end of the morning.

This afternoon we're going to be talking about barriers that exist to the development of biomass energy. It's been a goal to see these kinds of energy projects develop in the state, but there hasn't been a lot of forward progress in recent years towards the full utilization of the biomass resource that is available.

And so we're going to be talking about both case studies and policies and other issues that represent barriers to biomass development.

Tomorrow morning we're going to be talking about incentives, things again through case studies and also through discussions about particular policies and financial practices that might provide greater incentives for the more full utilization of biomass here in California.

And then in the afternoon the very important topic of sustainability is going to be addressed.

Now, at each -- we have some goals or objectives for this meeting. Certainly want to try to provide information to all of you who have attended here, about various aspects of biomass development.

We very much want to encourage, however, your participation and your discussion. So at the end of the day in particular we've set aside an hour or more for public comment.

There'll be opportunities when speakers are finished to ask questions and so on. But we'd very much like you to think of this as a meeting in which you can actively engage your own thoughts and ideas about ways forward for biomass.

So we want to solicit your ideas on better ways to achieve greater and more sustainable use of biomass for energy here in California.

And also from the point of view of the Collaborative, we'd like to encourage you to think of things that you think the Collaborative might or could do, what else we could do, what more we could do to facilitate this process. The Collaborative is in a state of constant development and evolution, and any thoughts that you have about that would be welcome.

So you were handed out a set of forms with your program. And what that set of forms is, has the name and the title of each speaker's presentation. And a place for questions, for you to write them down as they occur to you.

So, for instance, if there's not enough time after the speaker's presentation for those questions they can be brought up again at the end of the day.

There's also a place for you to make a note or as a thought occurs to you for suggestions about policies or programs that might be useful to forward the development of biomass energy. Also a section for the Collaborative.

So if you would be willing to use those forms, first of all, I think it will help keep track of things, as ideas occur to you. But also we would like to collect them, if you're willing to give them to us at the end of the meeting. And they will become a part of the record of the meeting.

This meeting is being taped, so all of your questions and comments will be part of the record. And those comments will be posted with the presentations on the Biomass Collective's website under the Sixth Annual Forum.

And we'll also summarize these ideas and suggestions and post them on the Forum, as well. So we want to thank you very much if you'd be willing to do that.

And lastly, I showed this slide at a previous talk, but I was struck by it when I found it. Okay, so let me read what was supposed to be on the slide.

This is a quote from Ernest Schrodinger. And Schrodinger was a physicist, one of the great physicists of the 20th century. And he got interested again in a question outside of physics. He got fascinated. In other words, what was the nature of life, how could life possibly be, how could it arise? Especially from physical and chemical basis.

So he said, I can see no escape from the dilemma resulting from the vastness of knowledge and the limits of my own mind, the single mind. And that some of us have to venture to embark on the synthesis of facts and theories, but albeit with second-hand knowledge of some of them, and at the risk of making fools of ourselves.

Why do I have that here? I think, in fact, that we are at a really phenomenal point in time in our history, where we have recognized the need to alter, at a very fundamental level, how our society operates

So it requires all of us to stretch; to go outside of our disciplinary boundaries and to try to become, at some level, integrators because we're at this point of change.

And so let me encourage you to be willing to take a risk here and there, even with your ideas and your comments during the meeting as we go forward.

So, with that, we can move right along, move right forward. I have the -- I guess I'll be doing this. Okay, Rob, why don't you be the technician.

Our first speaker is Dr. Dan Sperling. Dr. Sperling is a very important individual in the state's energy policies. He's been a creative thinker, a formulator of policy for the state, particularly the low carbon fuel standard.

Dr. Sperling is a professor of civil engineering and environmental science and policy, and the founding director of the Institute of Transportation Studies at the University of California at Davis.

In 2007 Governor Schwarzenegger appointed him to the California Air Resources Board as a board member. He's written more papers that we can count, and books. And the most important one that I should mention is the most recent one. It's received quite a bit of notoriety. It's called "Two Billion Cars", published by Oxford Press. And I haven't worked my way through it yet, but it's on my reading table.

In the past few months he's been interviewed quite a bit on that book, including by Jon Stewart on "The Daily Show." Now, I've been on public radio, but no one's made Jon Stewart, so this is really quite remarkable.

So I think we're lucky to have Dr. Sperling. So, Dan.

(Applause.)

DR. SPERLING: Well, thank you, Steve, very much. I'll try to live up or down to that notoriety. So Steve's assigned me this simple and uncontroversial task of talking about the low carbon fuel standard and how it relates to biofuels.

And so what I'd like to do, so I'm going to start out kind of big-picture, kind of framing biofuel, where biofuels and LCFS fit in. And then bore down and really look at the LCFS, the low carbon fuel standard, in terms of, you know, how is it really constructed; how does it really work. Why are people getting all uptight and upset about certain parts of it.

So, just to frame it. Some of those graphics are not working here. That was a picture of my book up there. I know, I'm being censored, that's it.

(Laughter.)

DR. SPERLING: So there is this, almost any forecast that's done of the future of vehicles in the world shows that there's going to be huge increases in vehicles. You know, we're over a billion vehicles in the world today, actually up to about 1.2 billion. Now a little over half of those are cars and light trucks. The rest are buses, trucks and motorcycles.

But, as you can see, all the forecasts are aiming upward. So because there's so many more vehicles, and because there are so many already and there's going to be so many, they play a very large role in climate change. Because all of these vehicles are using, almost all of them are burning fossil fuels.

So this is the percentage of greenhouse gases that come from transportation in different parts of the world. And you can see why in California we're focusing on transportation fuels more than perhaps others are. And that is because in California transportation fuels account for about 40 percent of the total greenhouse gases in the state. Worldwide it's about a quarter; U.S. it's, you know, 28, 30 percent.

So, you know, because of this concern about climate change and energy security, California has embarked on a very adventurous path in terms of trying to reduce greenhouse gases. So you're all familiar with AB-32.

And actually the whole process started before AB-32, back in 2002 is when an act was passed, now called the Pavley Act, to reduce greenhouse gases from vehicles. And then in 2006, AB-32 was signed.

And an important part of AB-32 was a

requirement for early action items, to get things going quicker and not wait, you know, for the larger process to move forward. And the most important action within the group of early action items was the low carbon fuel standard, which was adopted a week and a half ago by ARB and will be going into effect shortly.

So, the overall strategy of AB-32, or the target, the requirement is to reduce greenhouse gases back to 1990 levels by 2020. That represents about a 30 percent reduction from business-as-usual. So if we didn't do anything we'd be about 30 percent above 1990 levels in 2020.

And then the Governor has issued an executive order calling for an 80 percent reduction by 2050. And this, you know, while he was one of the pioneers in being fairly aggressive about that, President Obama now has articulated the same target; much of the European Union. And so this is a goal that's widely embraced. And it's based upon the scientific work that's been done that says to stabilize our climate we need that kind of reduction by 2050.

So, in California, just to kind of

characterize what we're trying to do here in California, contrary to what many accuse the state of being, that is an island, the intent here is to be a model and a leader.

So, all of the rules and policies and regulations, including and maybe even especially the low carbon fuel standard, is being designed so that it's not only compatible and consistent with what others are doing or might do, but is a model for others. So it's being designed specifically to be imitated.

Because we understand this is a global problem. And whatever California does in terms of getting reductions in California, is important. But it's really a small part of what needs to be done. So everyone has to be participating in this.

The other part is to get the kind of targets we're requiring can't be done with technology off the shelf, or just, you know, small changes. We really need innovation.

So the focus of the low carbon fuel standard and climate policy generally is innovation, innovation and technology, but also in behavior and institutions.

Also, we need, you know, AB-32 requires an economy-wide approach. So it's both short- and long-term strategies. And unlike what you often hear in the discussions in Washington, D.C. when you talk about climate policy, it almost immediately is translated into cap-and-trade.

Well, in fact, for California cap-and-trade, which is not yet in place but it's planned, would account for only about 20 percent of the reductions by 2020.

So it's all the other policies and instruments and incentives and actions that account for the lion's share of the reduction 80 percent. And the low carbon fuel standard is one of those important ones. There are others like energy efficiency standards, vehicles efficient -- the vehicle greenhouse gas standards, renewable portfolio standard, et cetera. And so the cap-and-trade is just an overlay over everything else.

So, you know, transportation is targeted in part because it's big, and even more than that, it's growing. Emissions continue to increase. And so focusing on transportation, when we kind of just focus on transportation, what are the strategies. You know, we can think of it in a simple sense would be we have to target the vehicles, we have to target the fuels and we have to target behavior and mobility.

And the California ARB scoping plan and the California plan is to tackle all three of those. And, you know, as I describe it here, I'm not going to go into the vehicles or the mobility part, but, you know, the vehicles is turning out to look like probably the easiest part. The fuels harder; and the mobility hardest of all. But I'll leave that for another time and place.

So, the low carbon fuel standard was established by the Governor, by executive order in January 2007. As part of the executive order he asked the University of California to do an initial analysis and proposed design of the low carbon fuel standard. And Professor Alex Farrell and I headed up that research team from UC Davis and UC Berkeley.

It was a six-month, very intensive effort. We spent huge amounts of time meeting with oil companies, biofuels companies, electricity companies, environmental NGOs.

So ARB then adopted, you know, after a process over a couple years here, last week or a week and a half ago, ARB adopted the low carbon fuel standard.

So, these are just some numbers that show you, you know, this is kind of that three-legged stool. So you see the fuels part of it, you know, so vehicles are projected to get a 39 million ton reduction by 2020. The fuels 16 million. Although if you include the full lifecycle emissions it actually adds up to about 23 million. And then, you know, changing vehicle travel and behavior is 5 to 10 million tons. So, fuels are a big part of it, but not the most important part.

So, when we look at the low carbon fuel standard, what we're trying to do here is create a durable framework. You know, the problem we've had in transportation fuels is we've, over the years, tried a lot of things, you know. Those of you who have been around for awhile, you'll remember, you know, we did methanol in the 80s; you know, we tried battery EVs in the early 90s; we did, you know, CNG was kind of overlaid over the whole time, never very successfully.

Hydrogen was the fuel de jour six or seven years ago. And then it was corn ethanol.

Today it's plug-in hybrids. You know, who knows what it's going to be tomorrow.

And the problem is, you know, what I call this fuel de jour approach to it where the politicians, the media, the public, get fixated on the silver bullet solution of the day. They get focused on it, and then, you know,, it never lives up to its, you know, its hype. So then interest is lost, move on.

So what we're trying to do here is create a durable framework that will get beyond this ad hoc de jour approach to it.

The other part, as I said, is we have to really encourage innovation. We don't have, especially in the fuels area, we do not have the technology in the fuels we need to get to any of the targets we're talking about. Certainly not the 2020, and definitely not beyond 2020.

So we need a lot of innovation, and we also need to do this in concert with the rest of the country and even the rest of the world. We can't do this as an island. And we also, in a sense, we can't do this separate from what happens with vehicles and behavior.

So the way the low carbon fuel standard

works is, first of all, it applies to onroad transportation fuels, gasoline and diesel. Although there are provisions for generating credits when you use low carbon fuels in offroad vehicles such as certain types of actually electric forklifts will get credit for electricity use there.

There are separate targets for gasoline and diesel. Each one is treated as a kind of separate pool. So, like, for instance, biodiesel will be used to meet the diesel target and, you know, ethanol would be used to meet the gasoline target.

The target, and when I talk about the target, it is defined in a very -- in terms of a single metric. And so that's kind of one of the attractions of this, is in many ways the concept is very simple and straightforward. I know the details are not, but the concept is.

And so it's measured in terms of greenhouse gas emissions per unit of energy, or grams of CO2 equivalent per megajoule. And the target is a 10 percent reduction by 2020. And the reduction is gradual, and I'll show you the compliance schedule; it's backloaded so that more of the reductions are after 2015 than before it to meet that 10 percent reduction.

So, the other question is who's regulated. And you know, the easiest way to think about it is that it's really targeted mostly at the oil companies, the refineries and the importers and blenders of oil. And they're the ones where the real burden is placed in terms of meeting this requirement.

And then credits are essentially generated by all the other possible fuel providers, all the other providers of low carbon fuels. The biofuels, the electricity, natural gas, hydrogen.

Very important attribute of the low carbon fuel standard. And, you know, I should say the low carbon fuel standard is really a revolutionary policy and that's building on what Steve was talking about in his introduction here.

We're talking about transforming the oil industry and we're talking about transforming fuels. This is not a simple or easy task. And it's not going to happen simply or easily.

So it is, in many ways, very grandiose in its ambitions. And it's never been done before, okay. And that's another part. So this is a very innovative, creative approach.

But what's very interesting is that it's been widely accepted and embraced. Most of the major oil companies, in fact, while they don't jump up and down with joy in embracing this, they have indicated that given that CO2 has to be reduced, this is probably the best way to do it.

And, you know, there's perhaps one oil company that doesn't completely agree with that, and it's probably the one you would guess, Exxon. They've been promoting carbon taxes and they really haven't engaged in this as much as some of the other oil companies.

So, in any case, what's also remarkable about it is that for something so revolutionary and that has such a huge impact, it's remarkable how broadly it's been accepted. I know some of you that have been in the wars of the last month or two might, you know, not have seen it that way.

But, you know, I was at a meeting with a bunch of legislators and some very conservative interests involved in fuels, and some not so involved, around the table. And over and over again they remarked that how impressive it was that this was being accepted, you know, in so many ways by so many different parties, you know, as the right way to go.

Now, the details -- so as you'll see, as some of you know, and as I'll talk about in a moment, the controversy has been about some of the details of it. It's not been about the overall construct, or the overall desirability of this policy instrument.

So, some of the attractions of it is it is flexible. It doesn't -- this is not government telling industry, you know, what to do or how to do it. It's just providing a target and saying you all go figure out what the best way is to meet this target.

And one of the ways it does that is by it allows all fuels to play. But the other way is it creates a market for the fuels in terms of tradeable credits. So the company doesn't meet, doesn't want to or can't meet the standard, they can buy credits from someone else that provides a low carbon fuel. So it creates a market. So what it's doing is it's harnessing market forces here. It's not a command and control rule by any means at all.

So the net effect of the low carbon fuel standard is it's going to increase the use of low carbon fuels and decrease the use of high carbon fuels. And it's now a petroleum, but, you know, things like tar sands, heavy oils, others that have either higher carbons.

But I would, you know, there are those kind of that are concerned about energy security that argue, that are concerned about this effect of reducing, you know, reducing the market or discouraging some of these higher carbon fuels that could contribute to energy security.

The response to this is that what the low carbon fuel standard does, it doesn't preclude those. What it does is say if you want to do those, do it in a more efficient low carbon way.

So we've had delegations coming from Canada about tar sands. And they've said, you know, some of them in their more private moments, let's say, have said that we can do it much more efficiently and we can capture some of the carbon. We can use lower carbon energy inputs. We could probably produce tar sands with smaller carbon footprint than gasoline from conventional oil.

So that's what we're aiming for, is not

to preclude those options, but when those options are done, do them in a more low carbon way.

So, this is one forecast of how the low carbon fuel standard might be met in 2020 for California. And as you can see, you know, biofuels plays a very large role.

The expectation or the hope is that after 2020 some of the electric drive options will become more prominent. The, you know, battery electric vehicles, plug-in hybrids, hydrogen. But probably up till 2020 the big share, the majority of the reductions will come through biofuels and advanced biofuels. That's where the innovation comes in.

And, you know, some of the studies they've done, some of my colleagues, you know, Bryan Jenkins and Nathan Parker have done a lot of analyses of, you know, how much biofuel is available and can be produced. And, you know, they come up with supply curves that show that, indeed, there's quite a bit of biofuels available from waste material.

So, you know, one of the, you know, just setting the stage for this controversy about land use effects, indirect land use effects, one of the important points is that what the low carbon fuel standard does is it incentivizes and encourages low carbon fuels.

And so biomass materials made from waste materials, crop residues, forestry residues, municipal solid waste, all of these -- biomethane, all of these result in very very low emission, carbon emissions. And there's a lot of that material around. So that's what we would most like to incentivize as fuels.

So, as I mentioned, the compliance schedule is back-loaded so that more of the reductions come after 2015 than before 2015.

So this is getting into this question of what are the emissions. And so, you know, because the way this standard is being constructed, it's a performance standard, it's an intensity standard. So it's a single number. Grams of CO2 equivalent per megajoule.

So therefore you have to come up -- you know, you can't work with probablistic functions, and, you know, get fancy in that way. You have to come up with a single metric for each fuel.

And so what ARB Staff is doing is, you know, they're working with others, and they're developing, they're doing an analysis of what the lifecycle emissions are for every different fuel chain.

And it's being done in a way I think that's good, in the sense that they're developing these parameters, but they're giving industry the option that if they think, you know, if the fuel producer thinks they can do better than what these numbers are that have been calculated, you know, using GREET model and all of the knowledge and information that's available, if you think you can do better, then you can provide documentation that you've done better and you'll get credit for it.

So, there's an incentive to keep doing better. There's an incentive for innovation.

And so in any case these are the different fuels and you see how they all fall out there. And it's all based upon a lifecycle analysis.

So this is another innovation of the low carbon fuel standard is this is the first time that this concept of lifecycle analysis has been converted and codified into law for any kind of major policy. And this is important because this is the right way to do it, but it's also important because this is going to need to be done for, you know, broadly for climate policy. This is the right way to think about it. So we're going to be doing much more of this.

I tell my grad students, you know, there's a great market out -- career out there for anyone doing lifecycle analysis.

So, we do it for oil, we do it for corn, we do it for all of the different fuels. So not all of them have been finalized, but, you know, that's one of the things the staff is still working on developing all of these.

So, you know, probably the most controversial part of this was the land use effects. And what's important is to note that, and the reason why this becomes an important issue is because there's huge amounts of carbon in the soils and the plants. There's about two and a half times as much carbon in the plants and the soil as there is in the atmosphere.

And so if you start messing around with the soils and the plants then you're going to potentially have a big effect on the net emissions, net greenhouse gas emissions.

And remember, the whole point of this is to reduce greenhouse gases. Or at least that's the most important point, of course. It's also to reduce oil use.

So, you know, these land use change carbon intensity values, you know, the science of it is still evolving. It's not very well founded yet. And so ARB had to work with what models and what data were available. And the kinds of numbers that were generated ranged, you know, fairly dramatically. You know, the article by Tim Searchinger that was in "Science Magazine" that really kind of launched the controversy, you know, with saying that for corn ethanol there was over 100 grams per megajoule.

Now, remember, gasoline is 95 grams. So therefore if you say that land impact, land use change effects of corn ethanol are 100, then you're already way, you know, going way beyond what petroleum is. So that was fairly controversial.

A lot of studies were done. So ARB ended up using this value of about 30 grams for corn ethanol.

An important point is that you have to -- okay, the thinking is that there is a land use change effect whenever you divert some land from agricultural production to energy production. There's a land use change effect. Theoretically there's no way you can argue with that. The question is how large is it. And there is uncertainty about it.

And so what ARB has done is they came up with this initial estimate. They think it's a little on the conservative side that the actual number will probably be larger after more analysis and more science is done. But used that value.

And that number will be reviewed periodically. There's going to be an expert advisory board set up to review it, and they're going to report back in a year and a half. But then there's going to be continuing reviews after that.

So, one other major issue with the low carbon fuel standard is that the metric is CO_2 per megajoule. But there are other environmental concerns. There are other environmental effects. There's water use; there's effects on habitats; local air pollution from facilities that are being built, especially this is going to be a concern in the San Joaquin Valley, central valley.

And so ARB is working to develop procedures to make sure that there are not these unintended adverse consequences from this transition from petroleum to other kinds of fuels.

So, just a couple slides on relating it to the federal government. So there's this renewable fuel standard nationally, the so-called RFS mandates volumes of biofuels. And it requires 36 billion gallons by 2022. I have the graph in just a minute. But it requires a certain amount of reduction for each of these sets of fuels that will be introduced, will be sold.

These are on the slide here. It shows you how much reduction. And I should emphasize that that includes the indirect land use effects. So this was built into the national program even as far back as a year and a half ago when that act was last passed.

So this is just the requirements, going up to 36 billion gallons by 2022. So, you know, California's going to benefit from that requirement because the best of those fuels are likely to be diverted, or some of them, to California in the near term. Eventually we hope that the U.S. will adopt its own low carbon fuel standard. And it looks like that is likely to happen.

And so the low carbon fuel standard, I think, is far superior as a policy instrument to the renewable fuel standard. Includes all fuels, as opposed to just biofuels, for the renewable portfolio standards, performance based versus a volume mandate. And uses market forces, the low carbon fuel standard uses market forces. The RFS doesn't. It provides incentives for continuing improvements, the low carbon fuel standard does. And it calls for larger improvements.

So the low carbon fuel standard is going international. You know, this is not just a California proposal. The European Union is moving towards a low carbon fuel standard. It has something called a fuel quality directive, which is very similar to the LCFS. They're moving more slowly than us, but they made it very clear that they intend to do essentially exactly what California is doing. In fact, they see it as the model.

Eleven other northeastern states signed an MOU to also adopt a low carbon fuel standard. The major climate bill in the Federal Congress, the Waxman-Markey Bill, has a renewable -- excuse me, has a low carbon fuel standard built into it.

And it would -- just a moment on that. The way it's designed right now, it hasn't been adopted yet, the way it's proposed is it operates in parallel with the renewable fuel standard. So the RFS and the LCFS are essentially in parallel, independent until 2023. So the RFS does its thing; and then the low carbon fuel standard applies to everything but biofuels. And then in 2023 they come together, and then they march on just like the California one.

So, just in closing, so what ARB is up to now, ARB Staff is doing, you know, since the adoption of the low carbon fuel standard, you know, a week and a half ago, is to set up the procedures for this credit trading program.

It's continuing to work on these carbon intensities for the different fuels paths. It's refining the calculations of this indirect land use change effect. And it's dealing with the sustainability impacts, you know, how do you safeguard against adverse environmental effects happening, sometimes referred to as backsliding or sustainability.

And it's coordinating with other states, with the feds, and with the EU and even Brazil, in making sure that all of this is consistent and compatible.

Thank you.

(Applause.)

DR. KAFFKA: I don't know if this microphone is on. Is this on? How's that, is that on?

DR. SPERLING: Yes.

DR. KAFFKA: We have a few minutes for questions. And if you would like to ask a question, please come to the microphone and give us your name so we can more accurately record it. Thank you. Dan.

DR. SPERLING: This is such a tame crowd, you know, when we had the board hearing on this it was quite rowdy. I guess everyone got worn out with --

MR. MATTESON: Well, I'll try and break the --

DR. KAFFKA: You have to turn the mic on, Gary.

MR. MATTESON: There we go, maybe? No.

DR. SPERLING: Yeah, it's coming on.

MR. MATTESON: Okay. One of the major precepts you're riding on, and I think you might as well clear the air on this for all concerned here today, and that is the CO_2 issue. And does this, in fact, alter climate change.

Is it going to have an effect, given the other aspects of climate change, such as sun spot cycles and the natural climate cycles?

So all of this effort we're putting into the CO_2 side, is it, in fact, going to have any effect upon climate change? Thank you.

DR. SPERLING: Well, I'm certainly not a climate science scientist, so that's not my expertise. But, you know, the consensus of the scientific community is that human effects on CO_2 emissions likely play a very large role in climate change.

And, you know, there are people that argue, there's all, you know, climate change is not, you know, due to human effects, and there's all these other effects.

Well, you know, maybe there's a 3 percent or 5 percent probability of that being the case. But are we willing to take a risk that, you know, the risk of climatic changes that are going to have economic, cataclysmic economic effects, environmental effects. You know, are we willing to take that chance. So I think that's the best response to that question.

MR. BERTON: This is Fernando Berton with the Waste Board. And has the ARB, you talk a lot about innovation and how achieving the LCFS requires a lot of innovation.

But has the ARB also looked at whether or not existing statute, law and regulations hamper that innovation?

Because one thing is to get the product, but you need, you know, you need to look at existing laws that maybe help move those processes along. So, have you done -- has there been any analysis done on that?

DR. SPERLING: With my ARB hat on, we hear from lots of groups concerned with all of the different energy paths, you know, waste materials and so on.

And so there's been a large effort to try to -- I mean ARB can't do this by itself. So, ARB, of course, is trying to identify where there are these institutional or regulatory barriers and other kinds of barriers, market barriers as well.

And to work with partners to reduce those.

And, you know, Susan Brown's going to talk about -- in a moment about, I'm sure, about the 118, AB-118 program that provides a lot of funding, you know, to help jump-start certain things.

And so, yes. The answer is yes. And I think we need help from all of you to identify what these barriers are, and you know, what needs to be done to make sure that we do see these advanced biofuels and low carbon biofuels come into existence.

DR. KAFFKA: Two more questions. Steve.

MR. SHAFFER: Hi, Dan. Steve Shaffer. Two questions, one sort of your policy wonk hat, and bigger picture, and that is describe the differences between just a strict carbon tax and those efficiencies versus the LCFS. Because that is something that's come up a bunch.

And then the second question is more in the weeds. How do you see the process moving forward through this work group to, shall we say, reduce the uncertainty of indirect land use change effects? And quantify that a little more rigorously. Thanks.

DR. SPERLING: You've come up with such simple questions here.

(Laughter.)

DR. SPERLING: But I've learned to give short answers. Jon Stewart trained me.

(Laughter.)

DR. SPERLING: Twenty seconds and you're cut off. You know, the question is this idea of carbon taxes and cap-and-trade, because you know, we talked about we want to use market forces. We're in a market economy. Clearly the best way to make major changes is harnessing market forces.

And so you talk to an economist and they'll say, you know, a carbon tax is, by far, the most efficient way to do it. And, you know, they are technically correct.

The problem is there's so many market failures and startup barriers. And what the low carbon fuel standard does is it's a forcing mechanism to overcome some of those barriers.

And just a simple way to summarize why the LCFS is a better option, at least in the near and medium term is that while my colleague at UC Davis who actually worked on the low carbon fuel standard development, wrote this paper that says carbon taxes are more efficient than the low carbon fuel standard, and he's technically correct.

But he also, if you talk to him, he'll say, and it's in the paper, that it costs. To get the same effect as a low carbon fuel standard you need a carbon tax of $10 to $30 a gallon. I don't see too many politicians out there willing to stand up for that.

Second question was the land use, what is the process we're going to use. I think we're just starting on that process. You know, we are looking for people to participate on this expert advisory group. And, you know, this is a science-based rule. You know, ARB almost, of all government agencies, is as science-based as you get, both in terms of the staff, in terms of how it thinks about it.

And so we really do want to get the science right. Clearly, the science is not well formed yet in this area. So, you know, the reality is we'll have an expert advisory -- this is my personal view now talking, this is not the ARB official view.

But we'll get it, we'll get an

assessment done. And it's going to show a lot of uncertainty in 2011. There'll still be a range, you know, maybe it'll narrow the range from what I showed you in that graph. And it'll, you know, I can't imagine they're going to say ARB number, 30 grams for corn ethanol, or the other numbers are way off. Maybe they will.

But it's going to take time. This is a long-term investment in the science of it. And so we're going to see, over time, those numbers refined.

You know, I note that EPA just released its numbers a few days ago for the RFS for the different fuel paths. And the numbers look very similar to the ARB numbers.

DR. KAFFKA: Last question.

DR. SPERLING: Last question.

MR. MONROE: Thanks, Dan. Ian Monroe, Stanford University, Sustainable Bioenergy Project.

I'm curious what's ARB's plan -- seems like the mic's not on -- but what's ARB's plan regarding those say biofuel producers that want to demonstrate that their lifecycle greenhouse gas emissions are below the ARB official default value?

Is ARB planning on releasing tools that are a standardized way of lifecycle assessment for individual biofuel pathways?

And then particular for the indirect land use change values, assuming that those differ for different regions, for example I'm working with a case study on sugarcane ethanol in the Philippines, which probably would be appropriate to use the same indirect land use change value as sugarcane ethanol from Brazil, how disaggregated are those indirect land use change values going to be relative to where production is actually occurring?

DR. SPERLING: Oh, boy, I get simple questions here, don't I?

Okay, so the first one is I don't know the answer to the first one. But, you know, in terms of how exactly what the details are, how the reporting mechanisms and documentation mechanisms will work for the different options.

But, you know, remember it's not for the entire fuel path. So you can do it just for each step in the fuel. And they did set a threshold, I think it has to be either 10 or 15 percent better than the default value.

So I think, I'm just guessing now, but what I would, as an academic I'd just say that, you know, use good techniques that are well documented, and data, and, you know, rely on, you know, other evidence that exists.

And the other one is for the Philippines, yeah, you know, the indirect land use -- well, the indirect land use numbers, you know, Brazil is kind of a unique case. But the indirect land use numbers are meant to be international numbers that cut across, you know, because these are international markets.

So I think there was a separate number done for sugarcane ethanol in Brazil just because it's so huge and unique. But I would imagine, and now I'm speculating, is, you know, come up with another number that's probably for the international sugarcane market.

But there will be only a limited number of these parameters developed.

DR. KAFFKA: Thanks. Let's thank Dan.

(Applause.)

DR. KAFFKA: Our next speaker is Susan Brown with the California Energy Commission. And, Susan, I'm sorry, I didn't get a biography for you, so I can't give you the kind of introduction that you deserve.

Susan works very closely with Commissioner Jim Boyd, and has been, I think, active for what, a least several decades, a couple of decade with the Energy Commission.

(Laughter.)

DR. KAFFKA: We won't talk about the number of years. So, Susan will be talking to us about Energy Commission policies, in particular, perhaps AB-118. Thank you.

MS. BROWN: I'm not that old, really. I am old, but not that old. I'm sorry you didn't get the bio. I have been with the state of California a long time, and I've seen a lot of changes over the years.

And I must say, Steve, it's really a pleasure to be here again today. I'm representing both the California Energy Commission and the bioenergy working group. And a number of my colleagues are here today. So, raise your hand, the members of the bioenergy working group. And Steve Shaffer is our emeritus member of the group.

So, some of us have been working on this issue of bioenergy for a really long time. And I'm here to say today that we still remain committed to the sustainable production and use of bioenergy in California.

And we have made some progress. Dan talked at length about the low carbon fuel standard. The renewable fuel standard at the federal level certainly sets a context in which biofuels and biomass-based fuels can operate.

But here in California we have a number of very progressive policies. Our aggressive climate change goals are certainly noteworthy in the planet. We have renewable energy goals which right now call for 20 percent of the retail power sold in the state to be from renewable sources. And we have the Governor's bioenergy goals.

So I want to talk a little bit about what we're doing at the state level, the policies that are in place, some of the funding programs. And I want to put forth the challenge to all of you, because we need your help, frankly, to overcome of the barriers to sustainable biomass production in California.

I think we can all agree that biomass is no longer just a waste. It is, in fact, a potential source of renewable energy. It has the capacity to significantly contribute to achieving the state's petroleum reduction, renewable energy, waste reduction, landfill diversion, forest protection air quality and climate goals.

We also have the benefit of reducing the risk of catastrophic wildfires, improving forest health, animal health, watersheds, local job creation and rural economic development.

And it was for all of these reasons that we asked Governor Schwarzenegger in April of 2006 to sign his executive order S-0606 urging state agencies to expand the sustainable use of biomass fuels.

And when he signed the order he said turning waste products into energy is good for the economy, good for local jobs and good for our environment.

So the Governor's order challenged all of us, not just state agencies, but all of us to take a series of specific actions to promote the sustainable development of bioenergy in California.

Now, the Energy Commission, for its part, continues to support this effort by its support for the Biomass Collaborative. In fact, earlier this year, as Steve knows, we approved funding for the next three years to continue the work of the Collaborative in addressing some of the barriers that we're going to discuss over the next two days.

The Commission, itself, has underscored the importance of harnessing our urban, forestry and ag waste as a source of biopower, biogas and biofuels.

In fact, we're also putting our money where our mouth is. In 2008, alone, the Commission paid nearly $15 million to solid biofuels developers through its existing renewable energy program. This funding represents over 3200 gigawatt hours of energy and it also allowed us to restart some biomass facilities at Chowchilla and El Nido, contributing another 25 megawatts of renewable power to California's electricity system.

In 2006 biopower represented roughly 19 percent of the renewable energy in California. However, the development of biomass power has not kept pace with the expected load growth.

So, to explore some of the barriers to

bioenergy development we held a public workshop last month as part of our Integrated Energy Policy Report. And here's what we heard from a number of speakers.

First we heard that competition for a limited biomass supply is becoming a major issue for developers. In particular, the biomass power industry is concerned about the high cost of obtaining and transporting biomass fuels.

Access to biomass fuel on federal lands remains restricted by federal law, despite the adequate protections in state forest management practices. The availability of air quality permits and offsets in areas like the central valley can make permitting of biomass facilities, especially onsite power generation, difficult and costly.

And today we live in interesting times, making the ability to obtain private financing very difficult in today's economic environment. And this is discouraging many shovel-ready projects, including some regional dairy digester projects in the central valley.

In addition, some have argued that biomass is a carbon-neutral fuel and it should be exempt from a cap-and-trade program. I mention that, Dan, because I know that your staff at the Air Resources Board is considering the issue of how to treat biomass as part of the development and design of a statewide cap-and-trade program.

So, there are a number of barriers. And some of these barriers remain formidable. And that's why I'm here. I'm here to challenge you, all of you in this room, not just the state agencies, but the developers, the industry, the public interest groups, to come up with some innovative solutions. And I think Dan actually mentioned that, as well, in his talk.

So, in many respects I think that the problems facing California's biomass industry are some of the same problems encountered by any maturing technology on the cusp of commercial development.

We have very positive policy drivers and some funding programs that we hope can help. We know that climate change has become a major policy driver. And as Dan mentioned, we have a low carbon fuel standard in California which will incent the development of advanced biofuels, we hope, to displace carbon in traditional gasoline and diesel.

We think perhaps one of the more important policy changes that will affect biomass power is the establishment of a feed-in tariff. And such a tariff would tie the cost of renewable energy, not just for biomass but all forms of renewable energy, to the price paid for electricity from a natural gas fired power plant.

The Energy Commission has been advocating the establishment of a feed-in tariff for eligible RPS projects sized up to 20 megawatts.

So, there are a number of policy drivers already in place; a number of barriers that I've noted. And we hope that the recent announcement of some new funding programs at both the state and federal level will provide us some opportunities to address the need for new technology and advanced commercial bioenergy development.

I am pleased to announce that two weeks ago the Energy Commission released an investment plan for the alternative and renewable fuel technology program, which was authorized under AB-118.

This landmark legislation provides

critical funding for state incentives by funding alternative fuels projects which we believe can complement the low carbon fuel standard. In other words, the AB-118 program can provide funding for fuels that can provide credits toward achieving the LCFS.

The plan, as many of you know, provides $176 million over the next two years to stimulate clean technology development. The program will run for the next seven and a half years, providing as much as $120 million a year for the Energy Commission, and up to $80 million a year for the Air Resources Board for its part of AB-118.

This program provides a unique, one-time opportunity to leverage funds now available from the Obama Administration and from the congress under the American Recovery and Reinvestment Act, affectionately known as ARRA.

Very recently Secretary of Energy Steve Chu, who we all, of course, know from Lawrence Berkeley fame, announced a major effort providing nearly $800 million in ARRA funding for accelerating research and development for both advanced biofuels and for commercial-scale biorefinery demonstration projects. So timing is everything.

Secretary Chu stated, developing the next generation of biofuels is key to our efforts to end our dependence on foreign oil and to address climate change, while creating millions of jobs that can't be out-sourced.

So I'm very hopeful. I think we have some policies in place, and I think we now have the opportunity to leverage significant funding available for both the state of California and the federal government.

So, in summary, California has substantial biomass resources which present both challenges and opportunities. The opportunities are a very positive policy environment, the availability of state and federal funding. These can make widespread development of biomass possible.

But make no mistake, the problems and issues are still formidable. The barriers will require creative solutions. They require all of us to work together to lower costs, reduce environmental impacts, and to help gain widespread public acceptance of biomass and bioenergy.

So, with those words, I thank you for

having me. I challenge you in your discussions over the next two years to work together to bring forward some creative solutions. And I'm very happy to answer any questions. So, thank you, Steve.

(Applause.)

DR. KAFFKA: There's an opportunity for questions for Susan. And we have a couple more minutes, Dan, if you're willing to just take the heat a little bit more.

MS. BROWN: Yes, took all the really hard questions.

MR. HOLLEY: Good morning.

MS. BROWN: Good morning.

MR. HOLLEY: Pat Holley with Covanta Energy. Covanta operates six of those biomass facilities that you talked about here in California, approximately 130 megawatts of electric generation; approximately a million tons per year of biomass used in that process, half a million tons of which are agricultural derived, or orchard-based woodwaste, which would be otherwise burned in the open fields, open burned.

So we contribute to the state's air quality by reducing the amount of particulate and

CO emitted into the atmosphere.

I would also just -- I believe it is, but, yeah -- but would also encourage the representatives here in the room and state agencies to be mindful of the existing industry, which has been financially challenged due to historically low energy rates.

So any effects that come about as a result of increased biomass utilization could have a very adverse effect on the existing industry, which is, like I say, producing very good benefits to the atmosphere and to the renewable portfolio standards for the utilities.

So, the question is has consideration been given to the potential negative financial impacts as the planning process and rulemaking process continues.

MS. BROWN: I'm not sure your specific question relates to regulations, rulemaking?

MR. HOLLEY: Policy.

MS. BROWN: Policy development, absolutely. We're very well aware of the need for additional support for your industry. And Jason Orta is here today. Jason, raise your hand. He's your contact primarily for the kind of support we've been able to provide the solid biomass industry through our renewable energy program.

I do understand there is a roaring debate about competition for limited biomass resources. And I find that quite puzzling, Steve. And Bryan knows this. We've been saying for years that we're awash in biomass, that we have 80 million bone dry tons of biomass from our forests, our farms and our cities, from our landfills.

And I understand your predicament. Your predicament is that when gas prices drop, natural gas prices, then biomass power has to compete with a more affordable fuel as a source of power.

We are trying to work on the issue you talked about. I mentioned the feed-in tariff which is something we've been pursuing. There may be other incentives that you need, or other regulatory relief I think you mentioned.

So, yes, we're mindful of your issue. Thank you. Thank you for your comments.

Yes, sir?

MR. NICHOLSON: I'm Bill Nicholson from Marin County. If I might add a comment to what was just said. I do consulting work for the American Forest Paper Association. And they're not in California, but other parts of the country, even pulp mills are now concerned about this problem of the competition between fuels and wood to make pulp and paper. So, it's a broad issue.

My question is quite different. The municipal solid waste, and particularly the green waste that we collect in primarily urban areas, often is used for compost, which is a valuable use.

Would you say something about how the Energy Commission, and perhaps other agencies, should think about whether that sort of thing should be used for compost or fuel.

MS. BROWN: Are you talking about the issue of alternative daily cover?

MR. NICHOLSON: No. There are --

MS. BROWN: Oh, I see. You're --

MR. NICHOLSON: For instance, down on the --

MS. BROWN: Again, the issue of competition. So if the fuel is --

MR. NICHOLSON: Well, there's more competition, but nobody ever seems to talk about compost, which is a soil amendment. And I know there are several places in the Bay Area where it is collected and turned into compost and sold to the vineyards.

MS. BROWN: And that's a problem?

MR. NICHOLSON: No, it's not a problem, but how does the Energy Commission look at that? Just merely as a competitive use? And then if you're going to --

MS. BROWN: You know, I don't know that we have a view on the use of biomass for compost, but it would seem that it's better to use waste materials for a usable purpose than not to use them at all. I'm not sure if I can really say much more than that.

Fernando might have something to say about that, however. He's from the Waste Board. I'm going to bring him up here and let him tackle that one. Come on, Fernando.

MR. BERTON: I always have something to say.

MS. BROWN: He does.

MR. BERTON: As far as, you know, the competition, at least from our perspective it's not an either/or, you know, one is better than the other.

What we're looking at is our current

waste stream, the material that's still being disposed of, by and large, is about 56 percent biomass in nature.

So we're looking at programs to get additional materials out of the current waste stream that's still being landfilled, that could be used for other purposes such as composting or for fuel production or for energy production.

So, yeah, I don't think it's an either/or from our perspective. There's more stuff being landfilled, so we're basically -- Btus.

MS. BROWN: Thank you, Fernando. Hello, Michael.

MR. THEROUX: Susan, good morning. Thank you. Michael Theroux, Theroux Environmental.

I think the timing might be right for a much more aggressive outreach from each of the agencies through the interagency working group.

We have a lot of work that's identified, companies in all stages, early commercialization almost exclusively, trying to produce, trying to find a way to produce various kinds of alternative biofuels.

And we have on the other side a very

complex tsunami, if you will, of funding assistance. But from the contact work that I've done with the small companies, they're so daunted by the concept of trying to untangle what they see as layer upon layer upon layer of funding, and they have to few resources for -- in the first place, that that money won't do them much good for a long time.

But I think we have an opportunity to designate our resources to a degree to take the work that's been occurring for identifying these companies, and go to them directly and say, these things will become available. We have assistance that can help you find out specifically what kind of funding and assistance that you do need. And please rely on us. And make that outreach step at this time.

MS. BROWN: Michael, it sounds like you're advocating some kind of small innovative grant program --

MR. THEROUX: Yes.

MS. BROWN: -- that would be simple to administer. And I understand where you're coming from. I, for one, having a lot of difficulty myself tracking all the federal economic stimulus funds. It is, it's overwhelming. Every week there's another solicitation for a gazillion dollars that has special requirements and eligibility requires and criteria. And it's even hard for insiders to keep up.

MR. THEROUX: And every week another one or two companies show up that have six or seven years of work --

MS. BROWN: Yeah.

MR. THEROUX: -- behind them, a decade of work behind them, but haven't had any way to really surface and make any ability. So we need a liaise, an ombudsman of some form that has some teeth and has some funding behind it that can literally go to the companies and work with vetting, work with bringing them up out of the woodwork and get them to surface. Get them a little bit of funds and help bridge them out into the next steps.

MS. BROWN: I think your points are very well taken.

MR. FUDEMBERG: Thank you. My name is Jay Fudemberg. I'm a power developer. A comment on feed-in tariff, and then a quick question on it, as well.

Feed-in tariffs are a great way to break down a lot of barriers for us obviously. And enable us to get power supply contracts without the long and difficult negotiations that sometimes we have to endure with the utilities.

When you're working on that please keep in mind as I guess a central precept, is whatever you come up with, whatever the methodology for the pricing, it has to be financeable. So, keep the whole financing aspect of these things really at the top of the list.

And so if it's indexed to a highly volatile fuel that not going to help these projects get financed.

And I guess the question is related. Could you just fill in a little bit about where you are on a feed-in tariff, what the process is, and what your expectation is for a timeframe when such a great initiative might be adopted in California?

MS. BROWN: I'll give it a try, and then I might ask others -- Jason and others in the audience to comment.

There are two tracks, really. There's the legislative track which arguably has met some resistance from our partners in the utility industry, as you can imagine.

There's also an administrative track where the PUC, under its authority for ratemaking, could establish a feed-in tariff.

Now, there's been discussion about feed-in tariffs for, I believe, up to 5 megawatt projects. But they're still in discussion, no action has been taken. So, we're working very hard on that.

And your issue about financeability is one that we're very mindful of. In our last round of the Integrated Energy Policy Report that came through loud and clear, that transparency of contracting is an important issue.

We also have taken great issue with the nature of the utility procurement process which tends to be a closed process under high confidential, you know, confidential cover. And doesn't allow the kind of market competition that we'd like to see in procuring new electricity resources.

So, we're very mindful. Jason, or someone -- Jason, did you want to add to that? I'm looking at Jason Orta, who's one of the other, my other colleagues. I open the mic, if I could. Thanks.

MR. BARKER: This is Kevin Barker with the California Energy Commission. We did have a recommendation in the 2008 IEPR update. The recommendation was for a feed-in tariff for 20 megawatts and below. And it is to be decoupled from the MPR. We were recommending a cost-based feed-in tariff, differentiated by technology and size.

There was also a consultant report that was published May of 2009. And for things going forward, we are having a workshop on May 28th looking at financing for feed-in tariffs for projects greater than 20 megawatts.

MS. BROWN: Perfect, thank you, Kevin.

MR. MATTESON: Just to add onto that.

MS. BROWN: Gary. Gary Matteson.

MR. MATTESON: Gary Matteson, Matteson and Associates. That discussion on feed-in tariff made a point, unfortunately, of not having long-term contracts for biomass. In fact, it specifically stated that. And that needs to be corrected.

It was the only renewable energy source

that actually had a constriction on the term of the contract.

DR. KAFFKA: Let's give Susan a hand again.

(Applause.)

DR. KAFFKA: I'm running on my watch which says ten to ten. So we're going to start here again in ten minutes. You have enough time to get a cup of coffee.

I'm the first speaker and you don't want to miss my first slide, so.

(Laughter.)

(Brief recess.)

DR. KAFFKA: I wanted to announce we have a speaker at lunch that is not in your program. Ellen (sic) Tutt from the California EPA is going to be -- pardon?

MR. SPEAKER: Eileen.

DR. KAFFKA: I'm sorry, Eileen, I beg your pardon. Will be speaking to us at lunchtime after we get settled. We're going to have a buffet lunch, so I'd like you to, you know, just get yourselves settled and started. And at about 12:40 Eileen Tutt will be talking to us about the perspectives from the California Resource Agencies broadly about biomass energy. So I think you'll enjoy that.

Okay, let's see.

(Pause.)

DR. KAFFKA: Okay. There are probably as many ideas about net environmental and social benefit and what it means as there are people here. Perhaps even more ideas about it than that.

What I wanted to do with this presentation is to be a bit provocative, to lay out some ideas or some concepts for you to think about as we go through the program.

We have individuals who will be talking about this from a number of different perspectives. And I'm hoping that we can think, as I mentioned earlier, have an opportunity to think creatively about what we mean about this topic and how we can achieve the greatest possible benefits from biomass use.

The first think to keep in mind, I think, about biomass and the use of biomass for energy is that it's not new. We have all been fortunate to have lived at the peak of the oil era. And we're probably somewhere on the beginning of a downslope of that oil peak.

We've had enormous benefits from that peak. But prior to that time biomass was, for the most part, the principle energy source for humankind. And for many people in the world, it still is the principle energy source.

And the question is to what degree and how will it be used as we go forward in the future.

Now, I'm actually an agricultural scientist, so I tend to think about the role of energy in agriculture. And this is a very informative slide, because what it shows is that with the start of the fossil energy era we've seen an amazing intensification of land use. Much much more productivity per unit area of land, sustaining a much higher population of people than ever in the history of humankind.

Historically, to gain a higher yield people had to use more land. But that relationship was broken with the introduction of fossil energy.

So we've been able to grow more food, more diverse food, higher quality food and produced on less land than ever before in human history. And primarily through the use of fossil energy.

But as we all know, we have downsides to the use of fossil energy, and this is the classic Mauna Loa Curve, obviously. Everybody's seen this. We are seeing an increase in atmospheric carbon dioxide. And most people regard this as derived largely from the production and use of fossil energy.

In fact, the use of fossil energy is still growing. Coal is the fastest growing energy source, but we're still seeing increases, except perhaps with this temporary moment in time, when natural gas and oil use is also still peaking.

And the energy companies think that, in fact, there's as substantial role, for the most part, for biomass energy and biofuels in the future, and that all sources are going to be needed.

As Dr. Sperling mentioned earlier, some of those sources aren't necessarily improvements over the current fossil fuel arena, though they might be.

So, in fact, there is a potentially large role for biomass, both as a fuel provider and as an energy provider for straight electric power.

I'm going to try to cover these topics today. We're going to try to talk -- I think it's important for us to think about some of these issues. Is global warming a big or little problem. There's assumptions built into the new policies the state of California has adopted, in fact, that suggest that it's a big problem.

I also want to touch on the notion of change. Change is not always hard. In fact, for some people in some circumstances it can be quite difficult. One author calls it tragic.

I want to touch a little bit about the notion of net benefit, and particularly net benefit analysis, is it all about money.

A little bit about biomass, because, after all, the Biomass Collaborative. And then just identify at least some steps that will probably frame the rest of the meeting.

Well, is it a big or little problem? Up on your left you can see pictures from recent fires in Santa Barbara. There's discussions that the glaciers are going to melt; that seas are going to rise; that water storage in the high Sierra may be, in fact, threatened.

And there's been a large international effort to try to identify the potential from climate change. And so there's diverse projections about the effects of increasing CO_2 and other greenhouse gases on climate, in terms of temperature projections, in terms of the effects that these kinds of changes in temperature and atmospheric greenhouse gas forcing will have. This is the IPCC most recent report being announced obviously.

So we have to ask ourselves, while there is large consensus, no everyone necessarily is on the same page. How serious is global warming a problem. And how urgent it is.

And your answer to that will affect some of the conclusions you draw about what the best policies and solutions might be. If it's both serious and urgent, then what should be sacrificed to achieve reductions. Who should do the sacrificing. What steps should we take to make those changes.

Should sacrifice be voluntary or coerced. That's not a trivial problem for governance, in my view. And if the problem is serious but not urgent, then what are the best incremental steps.

Now, this is from the air board. The air board has taken the assumption in its policy that there'll be fairly substantial adverse effects due to climate on California's economy, and on the quality of life. Smoggy days, increased forest fires, a reduction of the snow pack, sea level rises, public health consequences, especially by late century.

And there have been some estimates of potential damage published. This studied by a couple of professors at Berkeley, Fredrich and Roland-Holst, suggesting that under low and high climate risk assessments there could be substantial damage to everything from water and energy to real estate values to public health.

So, I created -- I made what I've called the Dyson-Hansen scale. Now those of you may know that Freeman Dyson, who's a Nobel Laureate physicist, is one of those people who does not think that climate change is a big issue. And up on the right is James Hansen, a NASA scientist, who's been a climate modeler and been a strong advocate for significant policy intervention.

So, I've taken a stand about where we

might put -- you might think about where you fit on the Dyson-Hansen scale in terms of the urgency and the seriousness of this problem.

Richard Lindzen is a meteorologist at MIT who thinks that, in fact, there has been climate change but that most of it has passed us, most of the consequential effects of it. So he doesn't think that it's urgent and not that serious.

Bjorn Lonborg is the famous economist from Denmark who thinks that while global warming is real, it doesn't have to be acted on urgently from a public policy perspective.

And up on the right we see ex-Vice President Al Gore and our Governor. And I took the liberty of putting Dr. Sperling in there. He may object to where I put him. I put myself in there in kind of a neutral spot. I think it is both serious and urgent, but perhaps not as serious and urgent as others.

But you have to decide where you fit on that scale because it influences what you think perhaps what the best ways to proceed in the future will be.

Well, the Governor obviously is a

leader, one of those people who thinks that the climate change issue is very important. Here you see him signing legislation which is going to end global warming.

(Laughter.)

DR. KAFFKA: No, basically it is a very noble objective. It's a bit, perhaps, over-selling it. Of course, the Governor is perhaps also thinking about his future a little bit. He won't be governor forever, and perhaps he's looking for the Charlton Heston role in a remake of "Soylent Green". Maybe he's positioning himself for that role, as well. So, I don't know.

But there are a lot of important regulations that deal with global warming. The low carbon fuel standard is one that Dr. Sperling talked about. There's the Pavley Bill. There's AB-118. And there are others.

So the state has adopted, has taken the stand in the implementation of these policies that this is a serious -- both urgent and serious problem. In fact, we're all now on a carbon diet. We have to go from 1990 levels to 2050. That's a 90 percent reduction in per capita carbon consumption, which has never been. It's hard to think about. If you think about just changing your car and getting a more fuel efficient car, that's not going to get you anywhere close to the 90 percent reduction, for example. So the pathways are largely unknown, but it's a very significant challenge.

So we're going to all have to make changes that are going to be hard. You know, I mean the smart -- is the only car on the road that meets the current, the proposed standards for fuel efficiency, for just a gasoline powered car. Now hybrids do better. The Governor has got a green Hummer, but I'm not sure that that's going to actually make it.

And we're trying to make these profound changes at a time in California, at least, when government is not thought to be functioning very effectively. As Dan Weintraub has suggested, perhaps it's time to tear down and rebuild government from the bottom up. This, if nothing else, complicates making good policy around greenhouse gases.

And the greenhouse gas laws mandate a concern for sustainability. And this is a very difficult regulatory task. Sustainability is a very broad concept that includes human welfare, direct land use effects, conservation values, greenhouse gas reduction objectives. You could put other values in there. It's a very broad and illusive concept.

But what we have done effectively in public policy is to take the greenhouse gas reduction portion of sustainability and make it extremely important, if not preeminent, subordinating, perhaps, some of these other concerns that people might legitimately have.

So, when we're trying to make social change it's well known that it's difficult to do. We have history, we have history of government regulation, we have history of social preferences, we have cultural histories. And that's why really significant changes, according to at least this author, always implies some tragedy.

And when we're trying to solve a sustainability problem we have to, it seems to me, be prepared to lose something to get something else. We have to redefine our identity as a social system, what do we want to become and at what cost.

So these are just some images of change.

For instance on the right is an article from "The Bee" recently about closing of some lumber mills up in the Sierra Nevada Mountains because of lack of access to forest resources.

In the San Joaquin Valley recently, you may have heard about a march of farmworkers from Mendota and Los Banos protesting a lack of water.

Of course, if you have a Pontiac or you have a soft spot in your heart for GTOs, that's going the way of change, as well.

These are not necessarily insignificant or trivial things that we'll be forced to confront as we go forward.

And the public really isn't necessarily onboard with this. For instance, this is from the most recent survey by the Pew Research Center for people in the press. The public's concerns are primarily about economy, jobs and terrorism, if they were given their top 20 priorities.

Number 20, the lowest priority for the public, is global warming. Now that may be that the public is not aware, or it could be that there's resistance to change, and what it might imply.

So what do we mean by net benefit?

Well, typically when people talk about cost/ benefit analysis it's done by economists. It's a tool used, it's mandated. It attempts to assign a monetary value to the costs and the benefits of a particular policy, and then to compare them to the alternatives.

And so basically net benefit has typically been carried out in the realm of the economists. But that says that money is perhaps the measure of all things. And particularly the environmental community has been -- well, I'm skipping ahead a little bit.

The Air Resources Board was required to do a cost/benefit analysis in the AB-32 scoping plan. And based on their engineering and economic analyses, they suggested that the low carbon fuel standard would increase economic production and all the AB-32 regulations would increase economic production in California by 33 billion, increase overall gross state product by 7 billion, increase overall personal income by 16 billion on a per capita basis. That's about $200 to each of us. And increase jobs by more than 100,000. And it would result in improved public health. These are the outcomes of the cost/benefit analysis.

But cost/benefit analysis has been viewed by many people, by some people, at least, as suspicious, particularly in the environmental community. So Fred Ackerman, who teaches at Tufts University, is critical of it because he says it tries to put a price on things that are priceless. Some things can't be monetized. That there could be troubling tradeoffs. That you have uncertainty in these cost/benefit analyses.

You might have exaggerated costs, under-valued benefits. You get partisanship, difficult or obscure technicalities arising, and a lack of transparency in these benefits.

So, at first glance, optimization is something we all do intuitively. We all trade off in our personal and daily lives. Well, I'll do this, but now it's not worth my time or effort.

Cost/benefit analysis is a relatively intuitively obvious thing. But if important benefits can't be defined in monetary terms, then economists have to find -- easily, anyway -- then they have to find some way to try to monetize them when they're making these estimates.

If future outcomes are uncertain then sometimes best guesses are used. And these may ignore the worst-case hazards that motivate public policy concerns. And when the measurement of cost/benefit becomes complex and detailed, transparency may disappear and it may become subject to debate.

We see this in the low carbon fuel standard with the indirect land use change. That's really the heart of that debate.

And so Ackerman says this really actually is not just hypothetical. In fact, he was critical of the Bush Administration for, particularly for relying on cost/benefit analysis in environmental policy areas, in his discussion with Friends of the Earth.

What's better? Well, there may be better ways of making decisions that involve multi-criteria analysis, some form of holistic evaluation of costs and benefits. And a concern for precaution in this process.

Let's talk a little bit about risk and uncertainty. Economic analysis essentially relies on the notion that you can calculate the risk of anything. But to a great degree, in the world that we're facing in the future where we're trying to transform the entire energy economy, there's a great deal of uncertainty that functions there.

And one of the issues associated with uncertainty is that it can't be measured. In fact, at a higher order level there's no way, really, in times of uncertainty, to formulate an equation that will correctly predict failure of equations to predict. It is, in fact, an issue of how are we to know, and how are we to advance into the future.

So this is from Vinod Khosla, he presented this a couple of years ago at a meeting. And I was struck by it, got a copy of his slide. These are forecasts by the Energy Information Agency about the price of oil. That was their whole job to do. And it was just that issue.

You can see how far off the Energy Information Agency was in making those predictions.

Another one that Khosla mentions was the prediction made by the McKinsey Group, one of the high flyer business analysis groups. You have to pay a lot of money to get their work. And the predicted that there would be a million cellphones in the U.S. by year 2000; and there were 100 million. So, it's very difficult to go forward in the future.

So here, this is something that we can all think about together. We have costs and we have a tradeoff between risk and uncertainty. So where would your suggestions fit, and where do current policies fit on this cost-versus-risk and uncertainty scale.

Now I think it would be relatively cost free and unrisky for government to work hard to integrate policy to advance biomass utilization. It seems reasonably unrisky, but more costly, to invest in research and development.

Then you have the more costly things like cap-and-trade and carbon taxes, prescription versus performance standards. And then perhaps international regulations to try to restrict economic activity. These are my list. You might move these around and add others of your own. But I think what I'd like you to do is be thinking in these terms as we go forward.

Well, is biomass important? Well, at the California Biomass Collaborative we think it is. You can see this --

(Laughter.)

DR. KAFFKA: I know you're surprised by

that conclusion, but -- so this is, you'll find on our website, this is from an assessment of the actual biomass available and the potential biomass recoverable. I won't really dwell on it.

There's a more recent study that I'd recommend for you to look at that does a very innovative job of trying to link biomass availability to infrastructure, and optimize the two. And it was carried out by some very bright graduate students, Peter Tittman and Nathan Parker, Quinn Hart and Bryan Jenkins, of course.

And this is one estimate that's in that study of the price at which biomass can be procured and the biomass supplied from various sources. I won't leave this up because we're going to run out of time. But, you'll find it on the website. And it'll also be part of the proceedings.

So, what steps to take. Well, there are barriers to biomass energy. One of them identified in that report is energy infrastructure and its deficiencies. Other barriers that people have mentioned are clear standards for fuels and energy projects and definitions for biomass. In fact, what is biomass? What qualifies it? It's actually quite contentious in some cases.

Those of you who have businesses know that it's slow, expensive and work intensive, the permitting process. And we also have very expenses besides the permitting process of doing business in California all together.

We have some regulatory uncertainty still. We have inconsistency among regulations and between agencies. A barrier would be overly prescriptive regulation. Dr. Sperling tried to point out that the LCFS has struggled hard not to be prescriptive, but to be performance based. But I'm not sure that they've entirely made that standard.

There's a lack of regulatory integration. And there's certainly, as an incentive at least, a need for strategic public investment that at least one of the questioners this morning pointed out. We'll be talking about all of these in subsequent presentations.

And lastly, I think we need to talk about tradeoffs. This is from the CalStart 2009 document. It was a very good document. A meeting they had here a little while ago in Sacramento.

There are certain cases in which

technology does involve tradeoffs. Certain technology can bring about a decrease in one pollutant or problem at the cost of another.

So these relationships need study and evaluation, but they argue for coordinated emissions reduction strategies.

I think that we need to always keep in mind that we need to evaluate sustainability holistically, and that the critical issue for sustainability, in fact for survival of any organism over time and into the future, is flexibility.

In these times of profound social change, models aren't necessarily convincingly predictive. And I think that a sound process becomes preeminent. Applied science is always going to be important. In other words, new technology.

We need to do engineering and lifecycle assessment and predictive modeling. But as the stakes increase and the uncertainty increases, then we need to do integrated, more integrated systems analysis that includes social effects. And we have to make sure that our process is the highest quality possible, because the future is difficult to foresee.

So, with that, I'll take some questions.

(Applause.)

DR. KAFFKA: Well, yes. Would you give your name and speak into the mic.

MR. STANGL: Greg Stangl. The thing that gets me on this is it doesn't have any impact until you integrate that into the permitting process. You know, I think probably most of the people here are huge fans of lifecycle analysis.

But if you actually go to permit a biomass gasification system, there's absolutely no consideration of the lifecycle implication. It's what comes out of that tailpipe.

So you could, in fact, be doing something which is wonderful, and yet it would never permit.

DR. KAFFKA: Are you suggesting the need for tradeoffs in this case, or for something else?

MR. STANGL: Well, I'm suggesting perhaps a need for a concerted effort to get the air districts onboard with lifecycle, like, you know, NREL is advocating. Where instead of, you know, focusing on one criteria pollutant at the expense of all others, for instance you know, focus on NOx means you can't use lean-burn, which basically makes all of your other pollutants worse.

Or, you know, ignoring any type of tradeoff where if we generate the energy here, we are therefore not generating the energy over here. And so therefore, we can look at the net environmental cost.

And, you know, if we were able to kind of include that at the policy level, then we start to look at these things holistically. And that actually, you know, changes things on the ground. Whereas today that's -- it just clearly doesn't function.

DR. KAFFKA: So from a policy perspective you would urge the state to adopt some kind of holistic and integrated analysis?

MR. STANGL: Gosh, that sounds like one of those things that's just never going to happen. But --

(Laughter.)

MR. STANGL: But, yes. I mean certainly the specific suggestion would be, you know, net analysis for permitting, you know. I'd produce energy over here, therefore I don't have to use the energy that's produced over here. I can net those pollutants per megawatt or whatever you like t think of it, over mine. Rather than I'm responsible for permitting this, you know, 500 square acres. And therefore I am only looking here, ignoring every other impact that you have.

DR. KAFFKA: Thank you. Next.

MR. THEROUX: Michael Theroux. Steve, a nice segue, I think, off of the gentleman's comments. We do have those tools. We've had them for a long time. For the air basin it's called a strategic air basin planning tool. And in CEQA the programmatic environmental impact report.

It's -- what the EPA is asking us to do is take out an old dirty one over here and put in a clean new one over there, incremental mitigation.

And I think we can see that starting to come into our permitting process again as our agencies and our municipalities approach programmatic regional planning.

So, I would think that perhaps we're not net global yet, but I would suggest that that approach be applied to the regional basis. And it is so difficult when an agency only focuses on the postage stamp where your project lies, and cannot allow that the tools that you're implementing might actually be far greater benefit by replacing something that's on the other side of an air basin.

MR. NICHOLSON: Bill Nicholson. I observed that I would have thought I would have heard a bit more about the national security side of using biofuels, as opposed to, particularly on the transportation fuel side.

After all, we are somewhat concerned, as a nation, if not as a state, on importing oil from a variety of folk who might not be our friends.

DR. KAFFKA: That's part of what I would call holistic analysis. That's correct.

MR. BRENDEL: Hi. Alex Brendel from AlgaeFuel.org. I'm interested in that link that you gave of linking biomass availability to infrastructure. Could you give me that contact information again?

DR. KAFFKA: If you go to the California Biomass website you'll see the report.

MR. BRENDEL: What is the name of that report?

DR. KAFFKA: Bryan, do you remember what

it was called? The one that you and Peter and --

DR. JENKINS: Oh, it's the economic assessment of biomass in California.

MR. BRENDEL: I should talk to you. Are you an author?

DR. KAFFKA: Yes.

MR. BRENDEL: Okay, thank you.

DR. KAFFKA: Okay, thank you very much. Since I'm moderating this morning, I get the task of also introducing the next speaker.

Our next speaker is Dr. Jim Brainard, who is the Director of the Chemical and Biosciences Center at the National Renewable Energy Laboratory in Golden, Colorado.

He focuses, in his research, on understanding energy conversion in biological, chemical and nanoscale systems that will lead to future generations of renewable and sustainable energy technologies.

He got his PhD at the University of Indiana in chemistry. Had an NIH post-doctoral fellowship at Baylor College of Medicine in Houston. And a post-doctoral fellowship at Los Alamos National Laboratory.

He was at Los Alamos as a staff member,

joined there in 1983, and spent 25 years, prior to joining NREL in 2006. And as Jim mentioned to me a few minutes ago, he just couldn't pass up the opportunity to work on renewable energy. He's very excited about it.

So, Jim, thank you very much, and welcome.

(Applause.)

DR. BRAINARD: So this is a little bit of a different audience for me. As my bio states, I guess I'm a little bit on the technogeek science and technology side. But I think, I mean one of the things that I learned in the last two and a half years at NREL is while that's an important piece of the solution, actually I have to say I've grown to recognize that it's a smaller piece of the whole solution than I thought two years ago.

And the kinds of things that we're discussing today, about changing the way people make choices and their behaviors, is a large part of the solution. And actually, I kind of liked the last slide that Steve used where, you know, applied science was sort of in a corner. But as you grew out, a bigger piece of the solution came from policy and social behaviors and the choices that we make.

So, I don't want to spend too much on this slide, but there are a lot of drivers that I think our increasing public awareness and the political will and the social will, to both work on the innovation side of providing some technology choices to us, as well as changing the way that we live our lives.

And, you know, whether it's melting of the polar ice caps, whether it's conflict in the Middle East, whether it's emissions over our cities, whether it's increasing fury in storms, whether it's the ecological disasters from oil spills, or whether it's flooding of our coastal communities, those are all things that I think are making energy and its use much more real to many people around the world.

And the way that the DOE, and to some degree the National Renewable Energy, and to some degree my own personal view, you know, this is a nexus of really three areas that we need to respond to.

And one of those is energy security, you know. The places that we get our energy, or at least a fraction of our energy from today are unstable. We're subject to the price that OPEC puts on the oil.

We're facing some very tough economic challenges in the near and long term, which I think a more sustainable energy policy will help us address. And importantly, I think we're beginning to recognize the effects of energy use on the environment. Whether it be through carbon emissions or whether it's from land and water use.

So I've got a couple of charts here which I won't spend a lot of time on, but I think it helps to set the context, and perhaps the size of the challenge.

This is a quad chart. It comes from the annual energy review. Actually Lawrence Livermore is one of the labs that has produced a lot of this data. But the primary message is we use about 100 quads of energy. Or if you want to use Steve Chu's units, about 100 exojoules.

And Steve was at NREL two weeks ago, and I was very gratified to see in his press conference he actually showed data which had standard international units in it. So I think we have a real advocate for science in the Energy Secretary position. And he is certainly passionate, as you guys, perhaps better than I, know.

We consume just a little bit less than that. And about two-thirds comes from domestic sources, and one-third is from imports. Eighty-five percent of our energy is derived from fossil fuel. And with the remaining 15 percent, about half nuclear, and there's all of the renewable energy. About half of that, 15 percent, is renewables.

And the use is split almost exactly in quarters with residential, commercial, industrial and transportation sectors.

This is a very complex slide, but I only want to make two points. Is that what this slide attempts is to show that it categorizes the amount of energy derived from all of these sources that ends up being useful energy, versus the amount that is dissipated through energy inefficiency. And most of that unused energy ends up as heat.

And so the primary message is in the title here, is that, you know, 70 percent of the energy that feeds into our transportation sector is lost. And 60 percent of the primary energy that feeds into our electricity generation sector is lost.

And that, by itself, wouldn't be that bad, except we were better off in terms of overall efficiency by a little bit in 1950 when I was in elementary school. So the trajectory is the wrong direction.

In the last, actually I guess it's in the last two years now, the scientists that are part of the European panel on ice core analysis, have extended sort of the record of ice core greenhouse gases to 800,000 years from the previous about, in the Vostok ice cores it was about 440,000 years.

And, again, I think the take-home message is very simple here. We are in a place, with respect to greenhouse gas concentration in the atmosphere, that we have not been at before in the last 800,000 years. And for that 800,000 years there is an extremely strong correlation between greenhouse gas concentrations in the atmosphere and temperature.

And so where we are right now we have not been before, and we can argue about this, but I think both the ice core records and most of the models today suggest that, in my opinion, the problem is both serious and urgent.

So I would put myself in the upper right-hand quadrant. Maybe not quite as far up there as Hansen, but close.

So, this is a slide that the deputy secretary for science for DOE uses. And I think the primary message I want to give is that I think it's going to take many approaches in order to put us where we need to be with respect to energy and energy policy and use. There is not going to be one magic bullet.

So, we do need some zero net emissions, electricity generation; we need to do fuel switching from fossil to renewable sources. And I think biomass does have a role to play with biopower in terms of the fuel switching solution there.

That's carbon capture and sequestration. I personally think the jury is still out on that value. I think that the value of sequestration, there's certainly a lot of interest in it. I think it's a technology and approach that we need to investigate. But at the same time, we haven't been too successful in burying things in the past, and I think it's important to recognize that as we go into the future.

Certainly a lot of the renewable resources that are of interest to us today are intermittent. And we need to figure out better ways to store that energy on cloudy days or windless days. And we need to improve the distribution and transmission of that power.

Here's where I believe biomass probably has the most important role to play in the sort of mid- to near-future, and that's in fuel switching for our transportation fuels. And if I think about it, really biomass, photosynthesis, trees, algae, whatever, is a well-deployed solar conversion device that converts sunlight, and many times atmospheric CO_2, to a product that can be converted to liquid transportation fuels. And that's a niche that arguably biomass is the only conversion technology that can fill that niche.

And while, you know, I can imagine driving electric cars and perhaps electric rail, and perhaps electric ships, it's hard for me to think about flying on batteries.

So, you know, I think there is going to be a continued demand for liquid transportation fuels. And perhaps that's a unique niche for biomass to fill.

Certainly end-use efficiency is one of the areas of low-hanging fruit. And it's an area where I think both federal investment and private investment has been lacking. You know, we are a society of consumers, and I think we have focused largely on the supply side and very little on the demand side. And I think that's a change that needs to happen. And finally the conversion side.

The good news is we are seeing a lot of both federal and private investment in renewable energy. So, I mean, this is an era at least that feels very different to me than anything that I've ever experienced. I think this is a sustained attention to energy policy.

And I mean Steve mentioned that the mission attracted me to NREL, and I have to say that it did. But if I talk to my colleagues there that have been there 30 years, the situation today feels very different to them than it has in the past.

And, you know, there are many people there that are in renewable energy for a long time; and they've been there in good times and they've been there is some very very dark times during times when the budget was really slashed.

So this feels like a very different time to them. And so there's a good deal of optimism.

There are some legislation that has requirements, not guidelines, these are requirements. And that is a semantic difference, but to me it's a very meaningful semantic difference. These are not targets, they're requirements to meet.

And I think, I mean it was interesting, we've all talked about sustainability, and I don't want to equate sustainability with benefit, but, in fact, I think it's an important part of the way that we need to frame our discussion about the benefits of biomass energy, and also renewable energy, as well.

And, you know, it is a very complex area. And I think it's an evolving area that will change as we spend more time talking about it, trying to put it in the context of what it is we're trying to do with renewable energy policy and deployment into the marketplace.

One of the biggest challenges, and I will readily admit that lifecycle analysis is an area that's very new to me. I think it is something that I've grown to appreciate after coming to the National Renewable Energy Lab.

We have a systems analysis group that does that. It's their primary role. The research and development that goes on in the biosciences, and chemistry center is, in large measure, driven by what their lifecycle analysis says of the technology barriers to impact on the marketplace.

But nonetheless, it is an extraordinarily complex process. And one of the things that I have a real hard time getting my arms around, and I think is part of the challenge, is how big is the system; what are the boundaries with respect to space.

I mean for a biorefinery to produce a profit for its investors, that's a very different spatial boundary than the impact that that biorefinery might have on greenhouse gas emissions. Or the impact that sugarcane ethanol from Brazil will have on the cost of the ethanol produced from cellulose in Washington State.

So, trying to define what's in the system, what's out of the system, what's the temporal period over which the lifecycle analysis is done, is still, I think, evolving. And we're going to learn a lot more over the next decade or several decades about how to do this right.

But I think we do want to have part of the outcome be changes in human behaviors. And, of course, we want to include both the inputs from the natural resources side, and the impacts outputs on the natural resources and ecosystems.

So, certainly one of the potential benefits of biomass is on greenhouse gas emissions. But, as Dan mentioned, sometimes including the land use changes is a very challenging thing to do.

Cultivation and harvesting practices, as well as the actual biomass energy crops that you use, affects the impact that bioenergy will have on greenhouse gas emissions, as well as the way that soil resources are used.

One of the issues that was brought up earlier in one of the questions was composting. And that's a sustainability issue. How much of the biomass is returned to the soil to insure that the soil maintains its productivity.

Can we recruit marginal lands that are presently not cultivated as a place to produce biomass. I think the economics of that are unknown at this time.

And there's a lot unknown about carbon sequestration. Dan mentioned that there's a huge pool of sequestered carbon in soils and plants. And small differences in the flux of that carbon cycling has a huge effect on greenhouse gas emissions, as well as on soil productivity.

Water quality demand and supply. You can think about linking biomass production with wastewater treatment. Great idea. Runoff nutrient contamination, ecosystem diversity, there are some advocates of a monoculture.

Certainly one of the big challenges for my group is coming up with enough flexibility in conversion processes that we can handle corn stover, switchgrass, poplar and municipal solid waste. That's a very big challenge to be able to handle the diversity of feedstocks.

And there are a number of proponents of having, you know, bioenergy crops that contain primarily diverse native grasses as opposed to a monoculture.

Economic benefits include, you know, regional economic development, primarily in rural areas. We are limited -- one of the drivers here is the transportation costs of transporting a low energy density feedstock is going to restrict sort of the centralized sorts of models for biomass energy production. And I think it will result in a much more distributed economic benefit.

But there are huge risks that are related to the global markets and what goes on in the Philippines and Brazil in terms of the price of biomass-derived products in the United States.

And we can think about a lot of different ways to introduce incentives and disincentives, to encourage innovation in markets.

This is a new era for us. There is not -- some would argue with this, but I claim there is not yet a bioenergy industry. It's evolving. It's a nascent industry, but I think we do have an opportunity to shape the way that it evolves. Perhaps to a greater extent than we have in the past. I think we have more awareness of the benefit and harm that can result from an energy infrastructure.

There are new ownership models that we could think about. There are certainly health effects that can result from fuel switching from fossil fuel to biomass-derived fuels. At the meeting last week in San Francisco, the Society for Industrial Biology meeting, one of the speakers mentioned that just a 10 percent reduction in gasoline use would, by some models, result in a savings of 2500 lost years of life per year. So that's a pretty big effect.

And there's fuel-versus-food debates. And I think in this era we need to be patient and allow ourselves to learn lessons.

This is my second-to-last slide. I certainly think the way that we put together the metrics to measure progress is a very important thing to think about. I think we want models that are transparent, that are intuitive, and that you can actually apply.

And we have to balance a diversity of characteristics, in terms they've got to work in Brazil, they've got to work in the United States, they've got to work in Europe, with some common principles and practices that everybody sort of accepts.

I think we have to have a level playing field which includes nonbioenergy components to the solution. I think we want to invest our resources where it will have the greatest impact on benefits.

And I think we have to let the models evolve. Things are going to change, behaviors, technologies, the economies. And, of course, we've got to deal with uncertainty, which is a huge issue at this point.

So I think in terms of bioenergy there is potential for both. And we, as a society, need to work towards practices and implementation of bioenergy solutions so that we work hard on providing the benefits and minimize the harm.

Certainly a part of the solution is innovation. But a bigger part in my mind is change. And I think we want to work very hard on making sure that we encourage both of those things to happen.

And to finish I'd like to acknowledge my colleagues at NREL who put me on the steep learning curve in this area. And I'll be happy to take your questions.

(Applause.)

DR. KAFFKA: Any questions or comments? Thanks very much.

DR. BRAINARD: Okay, you bet.

DR. KAFFKA: Our next speaker is Gerry

Braun. Gerry joined the California Institute for Energy and Environment, which is a University of California organization, in 2007. And is also now a technical consultant to the California Energy Commission in the area of renewable energy.

He has a number of years working with the federal government, a decade in energy equipment and project service industries, 13 years in the electric utility industry, and five years advising and managing venture-funded clean energy startup companies. It's really a perfect kind of background for our meeting, Gerry.

He has his degrees in mechanical engineering from the University of Michigan and MIT. And Gerry will be talking to us about state policy, some drivers and implementation.

MR. BRAUN: Thank you, Steve. These forums are very valuable. It's an honor to have the opportunity to contribute. In thinking about how I could contribute on the topic that I was assigned, it occurred to me that the Energy Commission has had recently a couple of very good workshops to secure input to its policy development process. One on biopower and one on biofuels.

And so I thought what I would do would be to pick maybe one chart from each of the presentations that were offered as input and try to summarize the message that goes along with the chart. And just share that with you. So, fairly simple outline.

Just to put it in context a little bit, the policy development process, every two years the Energy Commission takes some time and quite a bit of effort to put together a report that updates state policy. The big picture is trying to understand what's going on in the really fundamental parameters of supply, delivery and use; making sure there's enough supply to meet demand and so forth. That's the main point.

But then there are a large number of special topics. And as you can see, this is a long list, but a couple of them, actually three this year, are related directly to biomass.

Susan Brown covered the alternative renewable fuel and vehicle technology program. I won't address that. But, as you can see, we have a couple of other major topics related to bioenergy.

Just to -- if I whet your appetite in

terms of the inputs that I'm going to just touch on a little bit, these are the websites where you can go to look at all of the presentations in detail.

And I thought I would also mention, for those of you who are interested in tracking the $42 billion for energy that comes with the ARRA, there are a couple websites here that will let you do that pretty much in real time as new information comes forward.

Thinking about how to organize the inputs, I -- and this is very appropriate because I think maybe we need a new definition of economics in this rule, which would be more lifecycle economics or net benefits economics. But anyway I use this to kind of help organize what I'm going to present.

I'm presenting technology for biopower and biofuels separately. Technology drivers and impediments, economic drivers and impediments. And policy drivers and impediments.

And starting with biofuels and technology drivers, it seems to me that the Biomass Collaborative has a major driving role in providing the science-based integrated information and hopefully recommendations on which policy can be based.

And just trying to understand all of the inputs that I'm going to touch on makes me feel that this role is extremely important. And particularly in the category of biomass feedstock availability and sustainability. And obviously, the Collaborative, as you know, is addressing those issues.

Another major technology driver that we've heard about is the United States Department of Energy is making a very substantial investment in both research at a couple of national laboratories, and demonstration projects around the country primarily targeting biorefineries. And doing this in support of the renewable fuel standard of the Energy Security Act of 2007.

Four full-size biorefinery demos are underway; almost a dozen or so tenth-scale demos are moving forward. And several smaller facilities are also being funded. And then there is the $800 million that was mentioned earlier that will be on the table soon.

Another technology driver is the investment in fundamental research. California has the ball in a big way in this area. There are three major research initiatives that are involving California resources funded alternately by DOE, BP and Chevron.

And I think it's very important that these research resources that are being put in play here, that they deliver not only the results that their sponsors require, but also input to California's policy process in terms of their goals, their timelines, what's being learned and their strategies.

Also, the private sector is pushing forward in areas where it is obvious that major private sector companies will be active. Feedstock productivity, fuels infrastructure compatibility, and moving beyond corn and in terms of incremental innovation toward biorefineries that use multiple feedstocks. So there's a major private sector R&D investment, as well.

Impediments. This is maybe not a near-term impediment, but certainly we need to think about the impediments that may be ahead. If you look at what California has to offer in terms of feedstocks for biodiesel, they are all pretty much agricultural products and byproducts.

And, in general, the supply of these particular commodities is adequate for U.S. goals. But I think there's a need to assess the California supply for these feedstocks. Perhaps it exists, but it was not presented at the biofuels workshop.

Another impediment. It's clear, and I think I'll show you a little bit later some things that indicate this, -- and I think the study that was mentioned earlier about the supply of feedstocks, pretty much indicates that eventually there will be a transition from waste feedstocks to harvested feedstocks. And that may happen sooner than -- it may have to happen sooner than later.

There's a really important need for scientifically informed policy and strategy, because now we're beginning to look at specific places and specific agricultural or biomass stocks.

$42 billion. Plans are firming up for spending this amount of money on energy-related programs. And as you can see, the list of topics is quite -- renewable energy is quite prominent in these topics. There is an opportunity, obviously, for those who see needs that the federal government may not address in all of the renewable energy areas. There is an opportunity to convey that to, to convey what additional things need to be addressed by the states in these areas.

And I think that you'll see that I am particularly concerned about getting some help on the feedstock side of things. Because the R&D investment on the conversion side is immense. But I'm not sure that the feedstock side is getting the same level of attention at the federal level.

California consumes a lot of biofuel already. And a quarter of it, at least if I'm interpreting the numbers correctly, is produced instate. I put this as a policy driver. It's good to have a good start.

Some of the plants in California are idle, and that, I think, bears some discussion as to why and what can be done about that.

We've heard about the low carbon fuel standard, and I won't dwell on it. But to comment that we are looking at a proliferation of new fuel supply pathways. A lot of work needs to be done to understand how they come into play, and how that new infrastructure is managed. But it is certainly driving policy.

I mentioned the Department of Energy and the bottomline here, this is a chart from one of the DOE presentations. And if you look at the first bullet, I found it a little -- it just kind of got my attention. DOE says we are doing a lot of work to get biorefineries ready to roll. Would you states please make sure there are going to be feedstocks at good prices.

And, again, the point would be, yes, we can do that. But how about sharing some of that $40 billion to work on it.

And I noticed also that California, as usual, and I think it was pointed out adequately already, has helped to shape, by its work on the low carbon fuel standard, the refinement of the federal renewable fuel standard. And resulting in the introduction of concepts such as lifecycle analysis, and sustainability factors.

So, again, we have the ability to understand these things. We have set about to understand them. And the work is not done. A lot more work is needed to refine our understanding in a lot of areas that relate to net benefits.

We also mentioned in terms of policy

drivers the Western Governors Association. If you haven't noticed their work, I think it's worth looking into, is providing leadership and facilitating a lot of coordination, which again is the Biomass Collaborative's. One of the Collaborative's role is coordination. But it's coordination at the level of the western region.

And some very good reports. And with very ambitious goals for the western region in terms of biofuels and biopower contributions to the western grid.

I put this chart up as a category of impediments. This chart basically, I think, is designed to say that we have enough waste biomass available to serve both transportation and electricity goals through maybe 2022. I may be interpreting the information from the workshops incorrectly, but I'm not sure I believe that. And we'll come back to that a little bit later and I'll tell you why.

But, in any event, there is a need for more detailed fuel supply analysis relative to the very large numbers that start to happen even within the next ten years that are maybe five or even ten times more than our current fuel supply from biomass in California.

Now, I'm going to turn to biopower. And one of the nice things about these workshops is you learn new words, and then you have to look them up and it improves your education.

I learned torrefaction. And this is important because there is a potential for biomass cofiring of the few, but existing, coal-based power plants in California, to get another 50 to 150 megawatts out of that.

And the supply of biofuel because it may come from forests, it may need to be delivered in a very dense form that requires processing of the woody materials in situ, and then being delivered to the power plants. And it involves a process called torrefication. And it brought to mind, torrefied wood brought to mind terrified trees. But I --

(Laughter.)

MR. BRAUN: I had to share that. In terms of economic drivers, it's pretty clear, at least intuitively, that one of the reasons landfill gas-to-energy has moved forward pretty well in California is that the fuel is -- the economics are good. And there are new projects coming up.

There is a concern that this all has to happen at the local level, which it's a good thing. And it also creates kind of a problem for folks who are in this business because they're dealing with a lot of diverse customer requirements and so forth, and would prefer some sort of statewide standard for how to do this. But it is moving along well, driven by the economics.

In terms of, I don't know, I put this under technology drivers, that I think it's a driver that we have so much technical experience in biopower using solid waste. And I think it's a technology driver that local agencies are very much involved in funding and managing community-scale facilities that actually use materials that are generated at the community level. And I'm going to come back to this a little bit later. But I think this is a driver for biopower in the future.

Now, on the economic impediment side. If you look at the second major bullet and the bullets under it, what this is saying is the trends are not so good as far as fuel supply for

California's biopower facilities.

There are, you know, declines in materials being generated basically. And the industry solution, as they would propose, would require new laws and/or regulatory changes. That's good, that's policy that can be put in place. But putting policy in place is not the easiest thing to do and quick. So I put that down as an impediment.

A somewhat related impediment, if we look beyond the current waste streams and go to forestry residues and so forth, the costs for our index, in this case not according to bone dry tons, but according to green tons. And I don't know the conversion but I suspect that bone dry tons converted from green tons are considerably more expensive. And the green tons are already kind of at the margin of what is in, you know, where the current supply curve is, which I'll show you in a minute.

So, some work in R&D needs to be done to bring these costs down. That was the message that Doug Wickizer had for the workshop.

And this is the supply curve that I was referring to for waste material. It's hard to read. Dollars per bone dry ton on the vertical axis, and millions of bone dry tons on the horizontal.

But you can see, this is a typical supply curve. It's going up. And I think if you try to figure out where it's going from here, you can expect that it's going to continue to go up. And we really need to understand that. We need to understand where it's going.

This is the "don't shoot the messenger slide." What Commission Staff has apparently concluded is that the percentage of the 33 percent RPS target that is going to be met by biomass may fall to 11 percent by 2020.

And staff is proposing that the target be met by a combination of biopower and solar power. And that is under active consideration. So that could be an economic driver for biopower if the right incentives are put in place to increase biopower's share. Or it could be an economic impediment, depending on how it plays out.

The policy driver for biopower, one major one is the offsetting greenhouse gas. We've heard a lot about that. Certainly by offsetting fossil fuel consumption in power plants, but also in terms of waste biomass. The other ways of disposal are not good, not greenhouse friendly. So there's kind of a double benefit for the current approach to biopower. But when you start using harvested materials the equations change. And that needs to be better understood.

And I guess one thing I wanted to mention is that something we did in the R&D program at the Energy Commission this past year was to invite proposals that related to integrated renewable energy solutions for communities. We called it RESCO, renewable energy secure communities.

The response was excellent, and we actually awarded more funds than we had targeted. And including a couple of significant biomass projects that are collateral to the technical integration projects. And I guess that will kind of be a good segue into my conclusions in a second.

Policy drivers, I want to talk about digesters very briefly. Digesters are a great thing from an environmental point of view. They're also converting what you get out of digesters onsite in the San Joaquin Valley where the cows are is not a good thing. And that's a big impediment for dairy biopower.

And, you know, so far about 1 percent of state dairies have digesters. But the momentum for dairy biopower seems to have reversed. What I think is needed, and this is my personal opinion, is that the next, you know, the next approach, pipeline injection seems to be gaining some traction.

But I think the state needs to focus on one approach and not continue to look at a whole range of things that could be done for dairy biopower, but actually integrate its policy around an approach that everyone can agree on. Because this is a resource that reasonably should be tapped.

And then I want to comment on the biopower resource, or the biomass resource. The potential, if you had access to all of the waste that's available for biopower, it's probably over 2 gigawatts. However, when you take into account, and I may be interpreting the data differently than more expert people would, but when you take into account that a quarter of the waste material that goes toward landfills is diverted now to compost, and the goal is to do a lot more of that, I think this gets back to the question one of the participants raised.

So I'm guessing we might be able to get another half of a gigawatt. But I'd like to see some analysis that says what it really is.

Conclusions. There's a major investment in energy conversion. But the U.S. and California fuel standards may require a relatively early transition to harvested materials that are not currently available or in production. And that could slow things down if it's not addressed very aggressively.

Biopower. The hinge seems to be feedstock costs and I would say industry profitability. When we talk about feed-in tariffs, the way they have been used successfully in Europe, the first step and the first objective was to create profitable industries that could drive their own costs down and deliver later benefits to the economy. That has been successful.

But if we do cost-based feed-in tariffs that simply say we'll pay what, you know, what it costs to do the next best thing, that's probably not going to work.

And then finally, I made the comment about community-based energy supply. I think if you think about communities, you realize that they endure. They are sustainable. They do the things that make things sustainable. And they have the biomass resources to work with, to deal with energy and make the balance between energy and other issues.

And I'm not sure we're using that capacity enough. And I would just like to suggest that we pursue that on a policy track. How can communities -- they want to be sustainable. There are 150 or so communities in northern California that have clean energy goals. How can policy help them achieve those goals, noting that every community has bioenergy resources.

Thank you.

(Applause.)

DR. KAFFKA: Do we have any comments or questions?

MR. NICHOLSON: Bill Nicholson. Let me make the observation or comment, but when you talk about harvested feedstocks, in California they'd better not be irrigated.

MR. BRAUN: Okay.

DR. KAFFKA: I'd like to -- but -- our last speaker for the morning before lunch, which will be the same place that we had coffee this morning and breakfast this morning, is Dr. Bryan Jenkins.

Bryan is the Director currently of the Energy Institute at the University of California at Davis. He is also, of course, the founder of the California Biomass Collaborative. When, 2003 was it, Bryan? And a professor in the department of biological and agricultural engineering, specializing in combustion and energy processes related to combustion.

He really needs no introduction.

DR. JENKINS: Well, since I didn't give you a bio, I guess I don't need an introduction anyway. Thanks, Steve, for that, that's great. And, of course, I'm not the founder of the Biomass Collaborative. Here are the founders of the Biomass Collaborative. So I had the pleasure in 2003 to be invited to take on the task of trying to start something like this, and it was a great privilege to do that.

Also, Steve gave me an easy task here. First of all, he put me right between you and lunch after a whole series of distinguished presentations which have covered everything I need to talk about anyway.

And being an engineer and talking about technology, and I actually don't need to propose anything about what we will do or what we should do. So I'm only going to talk about maybe what we can do perhaps.

But, anyway, one of the great things about being in the renewable energy sector, and actually in the energy sector overall right now, as we begin to move towards a sustainability based perspective for energy and really social development is that we don't need to be afraid.

I think that this is something I take immense encouragement from what's going on, and actually remain very optimistic. I've been in this field for too many years, of course, but it's really quite exciting to see what's going on and to see this transition that we will make over the coming decades.

So I don't know if Richard Lewellen was trying to predict where we stand 70 years from that point, but he did a pretty good job, I think.

So anyway, in making this presentation I had a lot of assistance from people who know a lot more than I do. So, any errors you hear in this presentation are, of course, my own; and maybe that goes without saying.

But it perhaps is also instructive to realize that biomass is a very complex material. Nature has provided us a very good resource for a lot of different things, including eating and survival. But beyond that, other types of energy.

And in doing that, we have lots of different conversion techniques. And so you've seen these slides before perhaps, but it's perhaps instructive also to be reminded that we have lots of different ways to go about these things.

But there is no, perhaps, clear-cut mechanism to get from a raw material resource to where we want to be with energy and other materials and products.

So we have, of course, integrated concepts. A number of speakers have referred to this. Gerry, for example, talked about this in his presentation just before me. And you'll hear some other things related to the other presentations that have occurred.

One thing to keep in mind here, because we have this immense range of possibilities of different conversion technologies and different ways of procuring feedstock and converting it into different products, is that we have to be very careful, I think, in the way we design our regulations and design our legislation so that we don't necessarily restrict unnecessarily how we go about things in the future. And I think we run a danger of doing that if we're not careful.

The other thing that I think is perhaps instructive to think about before we get too much into depth on what's going on currently, is that we don't have to be narrowly focused on the current state of affairs. We can also think about other ways to design the system, and really to take a systems view.

And this is something, for example, in transport energy. We can look at a whole range of different ways to convert biomass to produce energy for transportation. And maybe there are more efficient ways to do this than others.

And, of course, I mention this partly because this has become of interest again most recently, as you read some of the literature, within the last week or so. You know there was papers that have come out looking at benefits of electricity versus biofuels. And so we'll see this debate continuing over the years.

And we don't necessarily need to select one or the other. I think, as we encourage the market and develop the incentives that are appropriate, we will see all these technologies coming forward.

So what do we have in bioenergy in California? Well, we have all of these things. We have electricity from biomass, of course. And we have had for many many years. Steam and heat also.

We have had an industry making ethanol in California. We also have developing industry in various other types of ethanol. We can produce methanol, for example. We have projects moving forward looking at mixed alcohol production.

Biodiesel, of course, has been produced in the state. We've had, as Gerry pointed out in one of his slides, landfill gas utilization both for power generation. I was involved in the late 1970s and early 1980s in projects that looked at pipeline injection of landfill gas, which we don't do now for quality reasons.

But my information suggests that the utilities may begin looking at landfill gas again in the near future because of technology improvements in cleaning up landfill gas to make it suitable for pipeline injection.

Also, of course, we have digester gas facilities on dairies and food processing units and wastewater treatment plants and the like. Some that have been operating for very long periods of time. And we have lots of biomethane projects, cleaning up biogas or scrubbing it to remove CO_2 to make it suitable for pipeline injection, as well.

Also syngas production, thermochemical means or producer gas for small power generation systems, or large power generation systems.

And then, of course, on the resource side, bioenergy crops. We had some mention of waste resources. I don't like to call them waste, as you know. They are resources and we'll move away from waste. But we have all of these going on in the logistics and the development of the entire system that will allow us to do this in a sustainable way.

In terms of electricity, we have a large number of electricity generating facilities in the state using biomass or biogas resources. Biogas, in my mind, is a type of biomass-derived material. So I'll lump it with biomass.

And Gerry also showed this in one of his slides in terms of progress towards meeting the RPS. And this is from the latest quarterly GREET report on the RPS from the Public Utilities Commission showing where we might be. If you look at -- I don't know if you can see this graph there, but somewhere along there you'll find 2009, and you'll see that we might be slightly below 20 percent, although we don't have the requirement till 2010. And the projection there is that we actually won't meet the requirement until 2011.

But then as we look at the contracts that have been proposed through the PUC and the utilities and think about where we're going to be with the 33 percent RPS for the 2020 time period, it looks like there's a potential to meet that, given the current proposals.

And as we move forward over time, I suspect that we'll see additional proposals that will keep us above that 33 percent level into the future. And, of course, moving towards the 100 percent at some point.

In any case I think we're, maybe there's concern over what we'll do with the RPS, but over the longer term I think we'll definitely meet the need there.

In fact, there were 500 megawatts of renewable power added to the RPS in 2008, bringing it to a total of new capacity of 900 megawatts since the start of the RPS in 2003. The PUC or the utilities received a total of 24,000 megawatts in bid. They're currently considering 2800 megawatts contracts, or approved contracts totaling 2800 megawatts in 2008. So I think we're moving right along.

It will be interesting to see how much of that will actually be met by biomass. I had a hard time seeing the bar on Gerry's chart there for biomass. So obviously biomass has a ways to go.

A lot of that capacity addition is actually being proposed for solar. Solar is perhaps the resource for the future as we move towards a solar economy. And it wouldn't surprise me at all to see an exponential growth in excess of any other resource sometime soon.

But look at the solid fuel biomass combustion industry. This has been really built since the Public Utilities Regulatory and Policy Act of 1978, which provided incentives for the industry. Actually all of the electricity industry, but this was the technology that was commercially available at the time. It's based on combustion, Rankin cycles to generate steam, drive steam turbines and the like.

At present we have more than 30 facilities in operation, about 33 facilities as I can count, and as my sources suggest, are currently in operation for about 600 megawatts of capacity.

We've had four restarts recently, or at least two have restarted and two are in the process. Another one is being considered for restart.

And you heard some of the issues addressed by Susan Brown who went through a litany of issues. I think Gerry talked about these, as well.

But, of course, financing is a concern

for the industry as we look to build this industry. Financing will continue to be a problem. We heard a comment about that from the audience earlier today.

The energy purchase price continues to be an issue. Currently we're at about 6.5 cents per kilowatt hour being offered for energy; and that's escalating at about 1 percent per year. I'll let you suggest what the other costs of operation are escalating at.

Contract provisions continue to be an issue, although there are new contracts being designed with the Public Utilities Commission right now.

Emission offsets for new facilities will remain an issue. As we try to build these facilities there will be pollutant emissions from them. That's pretty much true for all of the bioenergy facilities. And the question is going to be where are we going to find emission offsets in order to allow the industry to expand if we don't do something else about the emissions.

Fuel costs. We've heard quite a bit about fuel availability. I've heard very emphatically from some sources that it's not fuel availability that's the problem, it's the fuel costs. We have lots of fuel available to move the industry forward, but we can't afford to pay for it. So the question is how are we going to reduce the cost or how are we going to move the market so that fuel cost is not such a determining factor in moving these facilities forward. And not just these types, but all types.

With respect to that, also, is the definition. We get into trouble sometimes with definitions. For example, with some of the new contracting that's going on, the federal renewable fuel definitions being used, what constitutes a renewable biomass fuel.

Included in that, of course, or excluded, I should say, is that the forest fuels from federal lands are not considered to be renewable, nor are the urban wood fuels that are commonly used within the industry right now. They are not considered renewable, as well. So we have an issue there with respect to how we categorize fuels and how we gain renewable credit for certain types of fuels which physically don't look any different. It's just from a policy perspective they're not considered to be renewable.

Production tax credits, emission greenhouse gas reduction credits, bundling of renewable energy credits, or environmental credits. All of these continue to be a concern with the industry, and have been for a long time.

We're going to expand this industry or repower it, because a lot of the facilities are getting on towards 20, 30, some of them older than that. Many of them around 20, 25 years old.

We have a lot of opportunities to improve efficiency and essentially reduce costs. Of course, we have new technologies like integrated gas-fired combined cycles that might be deployed with biomass. They're probably going to be smaller scales than what we would see with coal. And as a result of that, the cost production or generation might be higher.

Also, fuel cells are quite intriguing, although their costs remain fairly high; and their reliability at present is not up to commercial standard. But potentially we'll see this developing.

Cofiring, as Gerry mentioned, also is a possibility. We see this a lot in the midwest where biomass is scheduled for cofiring or is being cofired with fossil fuel fired facilities; coal fired facilities in particular operating at much higher efficiencies than what our smaller biomass only, or most of the biomass facilities in California, for example, solid fuel combustion facilities are also cofired with natural gas for stabilization, or for energy production. They're allowed to do that and still remain qualifying facilities.

But firing biomass into a coal-fired facility at say 35 to 38 percent efficiency will get us more electricity, of course, than firing at something between 20 and 25 percent on a standard biomass power plant.

Also, there's opportunity, I think, for expanding through actually the industry creating its own emission offsets. And this was something I hadn't thought too much about until it was brought to my attention by one of the operators who indicated that they had proposed to add extra emission control capacity at their biomass fueled power plant. Reduce their emissions; and by doing so, create the emission offsets that would then allow them to add another boiler and add more capacity. So they basically increased their total capacity at the site by about 50 percent through their own emission offsets.

So it seems quite intriguing to me. Unfortunately they couldn't gain financing for this project, so they're waiting for the market to turn around a little bit in order to do this. But it's quite an intriguing opportunity.

Also, demand following. We talked a lot about the feed-in tariff here this morning. We have a small feed-in tariff, or at least a small capacity feed-in tariff right now in the state. If we moved it up to bigger facilities the question might be how do we better use the stored solar energy in biomass, because it's very conveniently stored for us, to do a lot more load following or peaking through the design of new facilities.

Certainly the rankin cycles that we're using now are not readily peaked, on a daily basis anyway. They can be done, they can load follow on a seasonal basis. And some of them will do that necessarily for economic reasons, to not generate so much on the weekends or during the wintertime period when they're not getting paid peak prices.

Also integration will be an issue as we

develop biorefineries. We'll see a need for power generation and steam generation and heat generation and the like associated with the feedstocks that are coming into biorefineries. We may find ourselves getting into some trouble with statutory definitions in this regard if we're not careful. I'll come to that in a few minutes here.

Also on a smaller scale, and I see at least one person sitting here who's attempting to do small-scale thermal systems. There are several demonstration or semi-commercial, and apologies to those who consider their system commercial.

But we have some of those in the state right now, they're in startup. There are various policy and contract effects. We've talked about these over the years. They remain the issue with the feed-in tariff and how we can provide additional economic incentive for these types of systems.

Of course, the issue over net metering. There are inequities in the current law which preclude us from net metering certain types of biomass facilities. Biogas facility can be net metered, but gasification systems are not net metered.

Also issues over departed load or demand charges associated with facilities that are doing a lot of onsite generation and the like. And, of course, the green attributes and bundling of the renewable energy credits, as we've talked about before.

The dairy industry, we've had a number of programs. Dairy power production program, for example, has stimulated a lot of development in this area in the state. Also the AgStar program and other federal programs.

This is sort of a rough estimate here of what's actually operating. We have something on the order of a dozen operational projects. And those of you in the audience who know more about the status of your projects than I do, can inform me on this.

But about perhaps half of those are operating at present. And the others are not operating for various reasons. Some of it has to do with emissions, some of it has to do with economics.

We have project types in electricity, pipeline injection and vehicle fuel. One dairy, for example, is now compressing gas for truck fuel.

We look at some of the air emission problems that have plagued the development of this industry, particularly in the San Joaquin Valley, we have various changes that have occurred recently that allow some to operate, whereas others will not.

For example, in one case, a dairy that was operating with older rich-burn engines has been able to replace those engines with new lean-burn engines and operate at a much higher emission limit than any new engine or reciprocating engine would be able to be installed at, for example. New engines will probably have to have NOx emission limits, or emission levels below that 9 to 11 ppm, which is fairly difficult to achieve. The standard is actually 1.5 grams per brake horsepower hour from the engine.

According to the district BACT has been achieved in practice. The practice is essentially microturbines with controls to meet those new standards.

And there is reported to be a food processor with a biogas microturbine which is achieving this limit with controls on the microturbine, although it's not clear to me that that microturbine is operating all the time. So that's something that needs to be followed up with.

The district does not currently consider fuel cells to be cost effective, so that's not the essential reason for the BACT standard.

Some systems appear to be achieving the standard with reciprocating engines, internal combustion engines, by using H2S scrubbers to reduce the sulfur content of the gas; and then using after-treatment catalytic conversion to reduce the NOx emissions using either three-way catalysts for the rich-burn engines, or there's a proposal to use a selective catalytic reduction on one facility that we will hear about a little bit later today. And I won't go into detail about that.

Some other systems are using some other technologies such as the NOxTech, which is a nonselective catalytic reduction technology.

As far as I can figure out, three systems right now are operating under variance from the district, so they're able to exceed the BACT standard under this variance. Basically for research purposes.

And so they're doing that in one case because they're also operating a vehicle fuel program in addition to electric power generation. And one of the new facilities which will be starting up shortly has a new technology using SCR which the district has agreed to allow them to operate with this variance. And if this system does not work, then they will revert to a higher emission level of NOx, 50 ppm.

Uncertainty is high in all of these numbers. Take this for what it is, it's my best estimate of what the industry is doing now. I'll be interested to hear from those of you here who know more about it that might be going on with the industry.

For the ethanol industry in the state right now, all of the corn ethanol facilities that I know about are down for various economic reasons. We're sort of on this teeter-totter where corn price is up and ethanol price is down. So the financial conditions are not the best for the industry. So all the facilities have been shut down.

Also, if we look at the latest proposed

rulemaking from EPA under the renewable fuel standard, the second one, the RFS2 that just came out last week, you'll see that the emission reduction for corn ethanol are at about 16 percent.

And you know that the Energy Independence and Security Act of 2007 requires certain greenhouse gas emission reductions. And the one that's required in particular is the 20 percent for this type of biofuel. And so that 16 percent does not quite meet the standard under the Act. So there's concern about this.

In terms of cellulosic ethanol conversion facilities, we have one in Lancaster which has received an authority -- air permits under the authority to construct. That's a fairly small facility, biofacility. You may also know there's a larger facility that's receiving DOE support, which is also proposed for development.

Of these DOE facilities, four out of the six original ones are continuing for these demonstrations. Actually DOE recently announced that they'll probably increase the support for these by about $176 million. And then we have a number of other pilot and demonstration projects developing.

So these are the six that were proposed originally -- or funded originally by DOE for the large-scale demonstrations. These are all about 700 tons per day cellulosic ethanol production facilities. And you can see two of them have been withdrawn, but the other four are proceeding, including a thermochemical facility which is strictly catalytic in terms of the liquid fuel production after a gasification process.

This is the RFS2 latest rulemaking; came out last week. You can see the standards for 2010. I think you saw earlier the graphs showing what we need to develop out through 2022. And so there's quite a big interest in producing lots more biofuel.

We look at this, you can see for 2010 we're at fairly low percentages for cellulosic biofuel/biomass based diesel which includes biodiesel in addition to other renewable diesels. And the advanced biofuels Dan talked about earlier today.

So for a total renewable fuel of 8 percent you can see where these more advanced processes are for the next year, which amounts to about, you know, a couple billion -- sorry, a couple hundred -- well, actually, sorry -- about a couple billion gallons of biofuel for a total close to 13 billion gallons.

And you can see what EPA says about this, just based on information from the industry, believe that there are sufficient plans underway to build the plants capable of producing .1 billion gallons.

And I guess to put it at .1 billion, it sounds a lot smaller than the 100 million gallons that we actually need to produce from cellulose. So that's an interesting thing.

Okay. These are the lifecycle greenhouse gas emission reductions that have been estimated with the RFS2 from EPA. You can see that the corn ethanol -- with natural gas doesn't quite meet the 20 percent standard, as well. EPA may exercise its option to drop that requirement to 10 percent, in which case that would be successful.

If you're fueling with coal obviously it doesn't meet the greenhouse gas emission reduction and actually increases them relative to the gasoline. And the other one we'll get to in a minute is the soybean biodiesel over there.

Dan talked quite a bit about the California low carbon fuel standard. I won't go into detail about this. Certain things you already know is that the indirect land use change effect is in there.

ARB is fairly confident in its estimates about at least being conservative. I think that remains to be seen with the additional research that will occur.

Some other things that are included in that, though, that you might not be aware of is that there are considerations for other types of systems such as anaerobic digestion and thermochemical conversion schemes to product liquid fuels.

And the state, in this case, seems to be going in one direction, while the state in some other ways is going in another direction. So we have to be careful to be able to reconcile this.

With biodiesel, the RFS2 soy disel greenhouse gas emission estimates that I mentioned are only a 22 percent reduction, whereas they need to achieve 50 percent reduction. And so there's a great deal of concern right now among the industry because soybean biodiesel is the major fuel that's being produced as biodiesel right now. The waste oils, of course, meet it quite clearly.

One of the issues I think we need to address when we talk about technology is where lies the jurisdiction of the state, and where do we really want the state to have jurisdiction in this process. Because obviously, as Gerry and others have pointed out, policy does influence things, as well as economics and technology science and engineering.

Of course, the state rightly takes jurisdiction in protecting human health and safety and the environment. And so all of the resources that are used in making products and waste and emissions and hopefully we can rid of waste, but I doubt we'll ever get rid of all the waste. So the state has jurisdiction there, of course.

In a conversion system do we really want to impose prescriptive standards such as what Steve talked about in comparing performance based standards, the prescriptive standards. I think we have to be very careful as we move forward with some of the regulations and legislation, particularly some of those that are moving forward currently. And how we classify for different technologies and what we really mean when we define technologies in law.

Because in many cases, for example, in this case you've seen some of this before with the biorefinery optimization modeling -- Nathan Parker is sitting, or was, he's asleep over there on the side -- been involved in this very elegant effort to optimize biorefinery siting by using some spatially -- I'll give you credit for that, Nathan -- resolved resource information in looking at infrastructure and how we might position these biorefiners to best utilize all of that. And, of course, maximize profit for business.

And if you look at the analyses that have been done, clearly contained within that are some estimates for gasification-based liquid fuel synthesis.

And then if you compare that with some of the legislation that's moving forward, for example, one bill pending right now includes the definition of a biorefinery and also includes within the legislation, a statement which says, very simply, a gasification facility is not a biorefinery.

It's still unclear to me what that means in terms of moving various types of technologies forward. Because we could be very prescriptive in some very simple statements like that, which would greatly reduce the flexibility of the industry to respond in various appropriate ways to meet the various objectives that we have for sustainability and renewable fuels.

So just to conclude here, with respect to technology mostly. I think actually we've realized some very good improvements in technology over the last few decades. Haven't made perhaps as much progress as we might have made, but we've made some very good improvements, I think.

Certainly the supply objectives that the state have are still subject, in many cases, to free commercial or very uncertain technology outcomes. And I think this is something that the state will need to pay attention to and to maybe adjust some of this based on where we stand with the technologies.

However, the incentives that have been provided and the market opportunities certainly have encouraged the industry and provided some incentives for innovation. I think we've seen some good innovation within the industry in trying to respond to some of the permitting issues, as well as some of the other economic issues associated with the technologies.

All of these regulatory interconnection and other integration issues remain. I think the awareness of the issues has gotten much better. We're certainly learning a lot about it as we move these technologies forward. I think we have to be careful not to shut everything down before we learn what we might out of it.

We do have to, of course, make sure that we do protect public health and safety. But I think the jurisdiction of the state in trying to work with the industry really does need to be very carefully considered in the way we design our regulations and the way we design our legislation in the future to make sure that we don't remove too much of the flexibility of the industry in responding in innovative ways.

Thank you very much.

(Applause.)

DR. KAFFKA: We have time for questions and comments. Give your name when you make your comment.

MR. HOLLEY: Pat Holley with Covanta Energy. Appreciate all of your comments, very informative.

A couple of comments. One related to an earlier statement about urban and forest fuel being considered nonrenewable. We feel this is a critical issue to the biomass industry. And at the federal level there's discussion on this point right now, the renewable energy standard, or the equivalent of the RPS here in California.

And there are conditions under which forest fuel would be considered renewable in those provisions.

Any such law which would come into effect in California which would limit the use of in-forest fuels as renewable would reduce our renewable contribution to the RPS targets drastically. So we feel that's a critical issue.

Similarly with urban fuel. If you make the assumption that the urban wood waste generated that's going into biomass plants currently was produced legally from forest harvest under approved harvest plans, certified by third parties, then it should follow that that would be renewable, as well, and sustainable.

Secondly, a comment about coal and biomass boilers in comparison, relative comparison, of 35 percent efficiency for a coal-fired boiler. And the assumption that if you change that boiler fuel to biomass that it would be 35 percent efficient. I'm not certain where those figures come from, but the energy density of biomass wood fuel is far lower than coal. And that may be part of the calculation.

In other words, the heat rate calculation in comparison may need to be reviewed before making the broad assumption that these old coal plants would be 35 percent efficient with biomass.

So, just a couple of comments.

DR. JENKINS: Yeah, thanks for those. Those are great. There are a lot of caveats that go along with this that I should make. Of course, with respect to the issue of the forest fuels and the urban fuels, I think this is -- I'm aware that there are discussions in Washington about this, and I think, you know, it needs to be an informed discussion. So look forward to seeing what comes out of that.

With respect to cofiring, there's been

quite a bit of concern actually about what happens to the efficiency of a coal-fired boiler. And I'm no big proponent of coal, I must admit. I think one of the best ways to sequester carbon is just to leave it in the ground to begin with. However, that doesn't get the energy value out of it, of course.

So, this was an issue that's been of concern with cofiring. A lot of the facilities have done very careful measurements. What happens to the efficiency of the boiler. Obviously, as you go up too high in the biomass you don't have a boiler that's designed for biomass, that's been designed for coal. So you may run into efficiency restrictions or reductions in that case.

Where you're firing 5 to 10 percent of the energy in the boiler as biomass it appears that the efficiency is not radically altered for the system. So that's pretty much what I mean. If you're firing, you know, 10 percent energy into a 600 megawatt coal facility you have a fairly large biomass power plant.

So, my comments are really with respect to that 5 to 10 percent cofiring level. Yeah. Thank you for that.

DR. KAFFKA: Steve.

MR. SHAFFER: Steve Shaffer. Hi, Bryan. I'll take you to task, also a little bit on assumptions, since you and Vashenk taught me so well about systems analysis.

On the slide you presented on miles per bone dry ton, and you had various pathways there. And looking at -- I'm forgetting now if there were two or three on ethanol, were they both the cellulosic? Was there a corn one? I'm forgetting.

But anyhow, --

DR. JENKINS: Well, you can take the 110 gallons per ton as corn if you wish.

MR. SHAFFER: Yeah. And I guess that's existing system. Is that using ethanol blended in gasoline, or as a neat fuel. And my basic comment is there are various assumptions built into that system. And each of those it would be interesting to look at optimizing each of those with technology moving forward.

So, you could envision ethanol as a fuel cell feedstock. And then your prime mover is an electric vehicle.

DR. JENKINS: Yeah, this is all true. I

think, as we look at ethanol or methanol or some of the other liquids as fuel cell feedstocks increasing the efficiency, there was one in there, it's hydrogen production, hydrogen that's different from producing ethanol from biomass.

But even so I think these can change a fair amount, all of these estimates, depending on that. But as we optimize across all of these we'll find some differences. And I would refer you to some of the more recent papers because they are quite intriguing, some of the analyses that have been done.

Not only just in terms of the efficiency of the system, but also in terms of the greenhouse gas emissions which goes along in part with that. But also has some independent effects.

Thanks for the challenge.

MR. BRENDEL: Alex Brendel, AlgaeFuel.org. You showed the map of the state of California where there's certain areas are high in biomass locations. And then it was mentioned that it's important to have infrastructure in order to harvest that biomass, to make it useful.

Can you talk a little bit about -- I mean, moving forward in the future, what are the infrastructure that's necessary, that you have in mind. What types of infrastructure are you talking about, equipment?

DR. JENKINS: I should get Nathan up here to give his presentation. But anyway, of course, you're with algae fuels, so one of the things that's not been modeled to any extent within the model that we have currently is algae.

So, as we build those types of production systems the infrastructure there may be substantially different than the infrastructure that we would have with, say, forest fuels or urban fuels or agricultural bioenergy crops and residues.

So I think the main thing in terms of infrastructure -- well, infrastructure needs to be developed across the entire industry. Certainly there's a conversion infrastructure that would need to be developed to meet the targets within the current bioenergy action plan and other plans at the state and federal governments.

There's a transportation infrastructure which needs to exist or be built. And that's something that the model attempts to at least put a cost on as to any optimization.

You have to look at the resource supply. But you also have to look at how the fuel gets out of the conversion facility and where it goes from there. How it enters the market. And so there's an infrastructure associated with that, as well.

So basically the model is attempting to identify all of the infrastructure from the raw material resource, the biomass, to the product going into final demand.

MR. BRENDEL: I'm more interested in conventional biomass, not algae, rice straw, corn husks. What do we need? Better combines, different combines? Is there an equipment?

I mean you mentioned transportation and I understand you've got to be able to shift the corn stalks or the corn cobs or the tree residue, whatever, to a facility where it's handled. But are there any missing pieces, any bottlenecks of equipment that come to mind --

DR. JENKINS: Well, for example, --

MR. BRENDEL: -- with conventional biomass?

DR. JENKINS: For example, in the case of rice, we have equipment that can harvest rice. Our only question is can we do it at a cost which is competitive with other resources.

Certainly we need improvements. In fact, we have a part of the program right now which has joined with us, Idaho National Laboratory, one of the national Laboratories. And they're working on more advanced harvesting systems and logistics. So we're attempting to integrate their modeling effort with our model to look at different logistical systems and what the impact on cost and profit will be, as a result of that.

Yes, we do need better harvesting equipment. Although with a fair amount of experience in the area, I would say that we have a lot of capability when it comes to at least agricultural materials when we're looking at bioenergy crops.

I think we've not developed sufficient capacity in this area to really understand, for California conditions, anyway, what equipment will actually be required and how we're going to develop an industry over time.

So this is an area for a lot of research and development. If that message didn't come clear in what I said, because I don't like to say well, we need more research, because I lack credibility in this regard because I'm a researcher and work for the University of California --

(Laughter.)

MR. BRENDEL: I'm used to reading that at the bottom of research papers.

DR. JENKINS: But, of course, we do need a lot more research in this area.

MR. BRENDEL: Okay, thank you.

MR. HUGHES: Evan Hughes. I wanted to comment on the efficiency of the coal biomass, or cofiring biomass with coal. You're right, 5 to 10 percent is a good number to use for the biomass energy fraction.

And the efficiency, I usually use about a 10 percent difference. 10,000 Btus per kilowatt hour on an existing coal plant and 11,000 for the biomass converted in the same boiler.

The range depends mostly on the moisture of the biomass, and it can be a 5 percent effect up to a 15 percent effect.

DR. JENKINS: Evan is an expert in this area, so I appreciate his informed comment there. I think we'll have to get Secretary Chu working on you, however, because you're still using Btus per kilowatt hour and things like that, so.

DR. TIANGCO: Val Tiangco, working for SMUD. Bryan, in your slides that show expansion and repowering I think I suggest that you should include hybrids, such as like what's happening in the San Joaquin Valley in the Coalinga area.

There is a plan to install CHP and fluidized bed combustor using biomass. And also other hybrids like geothermal and biomass, also.

DR. JENKINS: Yeah, that's a good point. Hybrids are integration. Of course, part of the collaborative effort that has been referred to here, you may know that we renewed the contract for the collaboratives and started up new collaborative, so we now have four collaboratives, renewable energy collaboratives working across the state.

We just started up a solar collaborative which is joined between -- an administration joined between UC Davis and UC San Diego. In addition to the biomass, wind and geothermal collaboratives we have.

So there's a lot of interest in integration across these different renewable energy technologies and other technologies. As Val suggests, some of the industry might benefit from better integration within these other technologies.

So, thanks for the point.

DR. KAFFKA: Thank you, again, Bryan.

(Applause.)

DR. KAFFKA: I wasn't kidding earlier when I said that we all have to be able to stretch ourselves and become more knowledgeable about a wide variety of topics. And I think this morning was a good example of that, a very good example.

We're going to break for lunch now. Lunch is over at the Sierra Room. At about 12:40 Eileen Tutt from the Cal EPA will be presenting -- oh, she just came in. Hi. Will be talking to us about her perspectives from the Resource Agency about biomass energy.

We'll start up here again at 1:15. So, have a good lunch and we'll see you back here.

(Whereupon, at 12:11 p.m., the forum was adjourned, to reconvene at 1:15 p.m., this same day.)

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AFTERNOON SESSION

1:17 p.m.

DR. KAFFKA: We'll take any comments now.

MR. THEROUX: We use the term biomass quite loosely. And there are so many both material differences between types of biomass and sources of biomass, and just as importantly, the purview, the regulatory purview.

I know it becomes very very difficult with our developers and with our municipalities to understand just what is biomass today. And what systems can we permit on what basis. There's so many different conflicting sets of rules. Whether it comes out as a fraction of municipal solid waste, or whether we're talking about biomass going to a power plant that can have a certain fraction of contaminant. Whether it's an agricultural material, as a byproduct, or agricultural material going to landfill as then becoming a solid waste.

So, I just ask to kind of keep our ear tuned to the nature of the source and the regulatory purview. And be a little bit more precise in what we are determining, what we are calling that material that we say is biomass.

DR. KAFFKA: Thank you. Actually, it came up at least briefly in comments that some of the speakers made, and some of the comments about their talks, of how biomass is actually to be defined.

And there are some regulatory definitions that at some level appear partially arbitrary or perhaps a result of the legislative process or the sausage-making process, depending on how you like to call it, that, in fact, can be inhibitory.

And I think, for instance, if you know of such definitions from the work that you do or in the contact that you have, it's one of those things we'd like to see you put down on your comment section and maybe bring up in the open discussion later on.

Rob, I think we're missing Mark Nechodom, who's supposed to be speaking now. He's probably making phone calls or something. So, if you wouldn't mind checking for me.

(Brief recess.)

DR. KAFFKA: Really started to raise quite a few interesting topics that I hope that we'll have a chance to address more directly later on today. For instance, I'm trying to bite my tongue because I'm the moderator. I have plenty of questions of my own.

The food-versus-fuel issue and other issues, as an agronomist, are very important to me, and I think that they're particularly relevant here.

Well, I have a suggestion. Is Tom here, Tom Christofk? Oh, here he is. Is Tom Christofk in the audience yet? Yeah, you want to start and we'll follow with Dr. Nechodom. I know he's here because I had a conversation with him.

Oh, here he comes. Sorry.

(Parties speaking simultaneously.)

DR. KAFFKA: We're all dying to hear from you, Tom. Okay, I'll introduce you then.

Dr. Mark Nichodom is the Deputy Director of the USDA's Office of Ecosystems Services and Markets. That's a pretty big job, I'd say. And he also serves as the climate science policy adviser for USDA's Forest Service in Washington.

He's been a research scientist at the Pacific Southwest Research Station in Davis, California, where he focused on lifecycle modeling and assessment, to identify the economic and environmental impacts of renewable energy from biomass.

And he also has led teams of researchers on carbon cycling and forest ecosystems, including wildfire effects and greenhouse gas emissions.

He's been very actively involved in the development of science policy and research in support of AB-32 here in California. And serves as the liaison to this process with the state agencies, and also with nongovernmental organizations.

Well, there are actually quite a few more things. He's had international work in forestry; worked on Lake Tahoe and forestry-related projects at Lake Tahoe, and a whole range of experiences.

We're very lucky to have him here. Thank you for coming.

DR. NECHODOM: Thanks, Steve.

(Applause.)

DR. NECHODOM: I apologize for having so many titles here. And I also apologize for sending such a lengthy bio; you didn't have to read --

Last week as I prepared my remarks, and you'll see in the program I'm here to talk about, legal and the siting issues, I discovered that there are, at least for me, no less than four very distinct ways of making this topic crushingly boring.

(Laughter.)

DR. NECHODOM: So, I have taken some liberty here because I have actually to thank my dear friend, Bruce Goines, who's with the Forest Service, state and private forestry -- I believe he's here in the audience -- and that's his dahlia. He sent me a picture.

It's to remind me to thank you, Bruce, for putting me straight on my pins because as I really worked through what we really needed to talk about here, it's not legal and siting issues, and I threw out all the slides that had sections of law or rulemaking or any number of entertaining things that we do in the federal government that nobody ever sees, for good reason.

And I thought what we really need to talk about is the ephemeral nature of the challenge and the opportunity before us.

Now, this is only a little bit of a

joke. This actually is a forest floor ephemeral. It comes out when the soil warms up in the east. And this is an eastern forest just outside of Washington, D.C. And it lasts only as long as the forest canopy allows it to go. And the ephemeral period varies every year, but it's getting earlier and earlier in Washington, D.C.

That means that we've got a little bit of time to act. And if we really ask ourselves, are we really serious, are we serious about what we're talking about here, I think we have far more sobering work ahead of us. And I don't mean to be stentorian or any kind of warning here.

But I wake up at 3:30 in the morning, and I'm not joking, I wake up at 3:30 in the morning and I think, are we really going to pull 5 billion tons of stray carbon out of the atmosphere. Are we really going to do that.

I ask myself, as the deputy director of a brand new agency at USDA. It is the only statutory authority currently in federal law, I think anywhere in the world, that directs, in this case, the Secretary of Agriculture, to develop science-based metrics for ecosystems services, most particularly carbon; protocols for accounting for and reporting those ecosystems services, particularly carbon; and registries and verification processes so that when carbon markets emerge, they're already here on a voluntary scale. But should we get cap-and-trade, and there would be a compliance market, we'd better damned well know what we're talking about.

Now, I'm sure you all know CCAR and now CAR, the Climate Action Reserve, there's the Climate Registry, there's the Regional Greenhouse Gas Initiative, there's the Voluntary Carbon Standard, there's any number of accounting systems out there by which we are doing the carbon accounting.

What we have heard in the last three months. since the initiation of this new Administration, is will you please get on with it. The federal government needs to step up to the plate and develop consistent nationwide standards so that we can turn what's currently a voluntary market in carbon, at about $60 billion a year, into probably two or three orders of magnitude bigger than that should there be a compliance market.

So, as I began to ask myself what in the hell am I going to talk about here in legal and siting barriers were not serious, what I really need to talk to you about is sustainability.

It's an over-used word, but if we're talking about the barriers to biomass utilization, which many of us have been around this block so many times that we hardly even wave at each other going by anymore, we're talking about the social license, the political license, the economic barriers. It's the willingness to pay, the willingness to move, the willingness to convert biomass if we're going to make it a part of our energy portfolio, if we're going to make it a part of our social benefits.

And these net benefits we keep talking about, I will show you in a minute my attempt to quantify many of them and then I'll move on.

Let me share an ecosystems services lens with you. Ecosystems services is kind of a big word, but -- a couple of words, but what we mean by it are the many many processes in ecosystems that sustain life. But it's not just about that. That's an angels dancing on heads of pins kind of exercise.

It's really where the social welfare or

the human welfare function and the ecological production function lines cross. What do we care about that are produced by ecological systems that may be amenable to quantification, that may ultimately be amenable to monetization and maybe ultimately to trading in markets.

So when we talk about ecosystems services markets we're talking about several steps of social valuation to where we get to the point where we're actually making them fungible and we're trading them.

We are also finding, I think now, without much doubt, in our analysis of the effects of climate change that many of our ecosystems services are increasingly scarce. That can be scary, but it's also an opportunity. Why? Because markets function on the allocation of scarcity.

So ecosystems services markets are environmental markets, whether it's species banking, water quality trading, carbon sequestration, emission reduction, happens because we declare, we recognize and then we declare, and then we quantify a scarcity in the system.

Now, it's not private markets. There's

really no such thing. Markets are made, not born. But they are private capital playing in markets whose parameters are created by government action. They simply do not happen without a regulatory framework.

No regulator, I, but I understand that markets only function because the regulators speak clearly, society speaks clearly, and then regulators speak clearly on society's behalf and say, these are the rules, go play. And where appropriate, markets can allocate scarcity far more efficiently than regulation, in some cases.

It also has the effect of forcing some transparency into the system which many of us, many of us in this room, many of whom I've actually worked with closely, have had this discussion about if we could only count the net social benefits, people would understand.

Well, science never speaks for itself, but science is absolutely necessary because what we're really talking about with lifecycle assessment, with ecosystem markets, is how do we internalize in the accounting what previously was an allowed externality to the system.

And under conditions of increasing

scarcity, the planet's crowded, hot, whatever Tom Freedman says it is, it's because we are now having to account for externalities that previously we were not obligated, or we didn't understand that we had to account for.

Currently the atmosphere is a 10 billion ton a year dumping ground for greenhouse gases. Are we going to charge a tipping fee of some kind? That is partly what's behind carbon markets, cap-and-trade, carbon taxes. It's essentially the right to put extra carbon in the atmosphere. I'll show you a graphic in just a minute.

But more importantly, and really powerfully, those of us who spend a lot of time interacting with the public from the federal decisionmaking point of view, and many of you in the state level experience the same, is this is really what society's asking us.

Sustainability is no longer a cliche we use to kind of beat people over the head because they're not being nice. Sustainability is how do we continue to derive the obvious well being and benefits we do derive from natural capital, our natural assets, but we do it forever. That's the logical implication. Not till next year, not till the next century, but forever.

You back from that question into the process, whether it's biomass utilization, or it's chemistry or recycling. You have to start with that question because that's what society is asking us, at least in the government, to answer more coherently than we have before.

So, I take this very seriously and it does wake me up. Not only that I'm on east coast time, so I wake up at 3:30 in the morning anyway.

(Laughter.)

DR. NECHODOM: I'm going to present to you kind of the U-2, you know, 70,000-foot overflight of what, in fact, those of you who are ratepayers in the investor-owned utilities paid for through the PIER program at the Energy Commission, is a lifecycle analysis of the use of woody biomass from the forest. So keep in mind there are four major feedstock sources; municipal recovered; there's ag waste, there's mill waste, and then -- I'm sorry, we're not supposed to say waste anymore, are we. Sorry, Bryan -- good stuff from, you know, ag and mill and that stuff.

And it's the good stuff from the forest that we did a lifecycle analysis looking at every single unit process that goes from the moment you decide that you're going to move material, saw logs, biomass, to a conversion process.

We built the models in such a way that we could unplug electricity conversion and plug in thermochemical, liquid, whatever; some of the stuff that Bryan went over just before lunch.

We believe that we have delivered a model that -- or a set of models, really, it's kind of a concatenation of many models, that helps decisionmakers really game out the implications of a broad landscape level management strategy.

Now climate change is really our focus a lot. This model was not developed with carbon in mind, but it served quite well in some of our carbon analysis, even though Greg Morris was less successful than he and we wanted to be. And I think he will be here; he's presenting some of his results. But he helped to develop the landscape scale greenhouse gas model.

But this is part of the tools that we have to use in order to do the disclosure, to do the transparency in the system.

We took what we called our beta landscape. This is familiar to you. In northern

California it's 2.7 million acres. We used a real landscape so we could figure out whether or not our models were speaking clearly.

And you'll see several areas of high asset -- somehow this works, maybe -- oh, well. For those of you not familiar with the geography, on the lower left lobe is the Feather River Basin; what PG&E calls its staircase of power, or staircase of cash, I think it is.

(Laughter.)

DR. NECHODOM: On the lower right lobe is the highway 89 corridor leading down to Lake Tahoe which is under incredible development pressures for resorts amenity values, ranchettes and that sort of thing.

So we deliberately took into account territory that could change in value because of the major disturbance factor on the landscape, which is wildfire. That's where we started.

Now, other things can be built in, but it's really the interaction between vegetation and fire at large scales that we were looking for the change agents that would then change values. Assets at risk, whether they're monetized or not.

This is the simple stick figure version

of our model. You don't want to see the more complicated diagram. But what we're really looking for is the comparison of a landscape without remediation treatments. We're not saying restoration, we're saying remediation. And treatments on the landscape that are intended to achieve a purpose, whether it's reduction of wildfire, extreme wildfire, or whether it is putting more carbon on the landscape; or if it's achieving better habitat quality, whatever.

You're basically changing vegetation on the landscape and you have other effects. There are economic effects, there are hydrologic effects, habitat effects, et cetera.

And we're looking for the net benefit at the bottom, the big blue bubble at the bottom. And somehow I think the Energy Commission's got the impression that we were going to give them the number. We didn't. But we gave them an entertaining show when we turned in our homework. And I believe they felt like it was $2 million well spent. It was about 3.5 million by the time we counted all of the in-kind contributions, et cetera. But I'm just giving you the accounting.

Generally when we've accounted for our

work in the B2E project, we focused on these domains. This is a little more complicated description or flow chart of the work we did, which is interaction of veg and fire up on the upper left. And then, of course, the lifecycle analysis is the part that essentially takes woody biomass from the source and compares it to natural gas generation or the California grid portfolio.

In fact, though, what is of interest, and I think what's more the focus of this discussion here, are those other things like habitat, hydrologic impacts, water flows, water quality, what other economic multipliers or disincentives come on the scene from doing either the disturbance or burning. And, of course, the lifecycle use that has the atmospheric effects from carbon sequestration and carbon emissions or greenhouse gas emissions.

This is a very very brief overview of the kind of nuggets we pulled out. The report, itself, is just over a hundred and some pages for the main report. The rest of it is about a ream, so don't print it without thinking about it. Several appendices.

But I'll point out a couple of them. I

won't go through the whole list, but I think some of them are quite significant. We saw, in our comparison of what we call the reference case, in which we applied no management over 40 years. We basically grew it and burned it in our modeling universe.

And then we also applied treatments; 13 different kind of treatments depending on the landbase you're on, whether it's commercial timber, nonindustrial private forestry, or public land.

And we found a significant, 22 percent, reduction in the extent of wildfire. But more importantly we found a shift from severe, or what you might hear as catastrophic wildfire, down into the lower classes where you actually get a burn that you don't mind if you're a forest and fire person.

We also find a 65 percent total lifecycle reduction in greenhouse gases. That number shocked me so badly that I actually embargoed the data. I had our teams go back and really take a very very close look to make sure we were correct.

And, in fact, we found in our lifecycle

analysis you take the whole system including wildfire, and what you get in comparing the test scenario to the reference case, is a 65 percent reduction; 65 percent fewer tons resulting in the atmosphere. So that's a pretty significant savings, and that's not with the playing with the different scenarios you could build.

We also have some significant power generation. We displaced some natural gas, et cetera. And you may notice on the lower right a bullet that says that plant operators can only pay $8.20 a bone dry ton for fuel.

That's a little counterintuitive if you're familiar with the biomass power industry. But let me explain this. Again, we went back and checked really hard. And, of course, I think some of you in the audience are people who went and checked this with a pro forma for building a new biomass power plant. Current financing; current technology, you know, standard stoker boiler, nothing fancy.

It would require you to reduce your fuel cost to $8.20. That's about the max you could afford to pay for forest-based biomass. That's not ag waste; it's not mill waste; it's not municipal recovered.

And that's a surprising number given that we know that it takes somewhere between, in our calculations, $45 to $85 a bone dry ton to bring it out of the woods. What's the difference? I think Bryan mentioned earlier, we have PURPA, we have amortized plants, et cetera. There are reasons that we found this number. It was a little surprising.

I'm going to shift, again ephemerally, into another analysis that I think we all need to consider carefully. And I will ask your forgiveness here. I'm showing you data that actually has to do with a study that has not been fully released, and we will be releasing it shortly. So these aren't necessarily embargoed, it's just that when I consulted with my dahlia-growing friend, Bruce, about what we should talk about today, we thought it was really important because this is part of a deep public policy discussion. I have three slides, effectively, to show you, and then I'll be done.

We took the 20 million acres of national forest land in California; 10.7 of which are not reserved, so therefore subject to logging activities on them.

Our current practices show an increase in tons. This is metric tons of carbon. Growing from about 752 million metric tons in aboveground, live biomass, harvested wood products and bioenergy offset, to over a billion in 40 years. That's about 11 million metric tons per year of sequestration, or net non-emission.

We were surprised by this. We built six other scenarios. I'll only show you one. This is what we call, for lack of a better term, maximum forest resilience. In which effectively what we do is take all those little stems that present a major problem, because there's lots of them, they're thick and they burn hard. And we harvest -- we remove a lot of the small stems and move it into larger stems, larger trees that are more resilient to disturbance. We model the same disturbance, and over 100 years you see a very significant difference in the carbon content in aboveground, live tree biomass, harvested wood products and bioenergy.

Now, these are two very different pathways for your federal lands in California. We are not entirely sure what to do about this.

Because we have not an obligation to harvest timber. We have an obligation for stewardship and long-term resilience and help of the public lands, among other obligations.

What's the right picture here? Because we could do California a huge favor by stuffing 250 million metric tons on the landscape on your public lands, and somewhere around mid-century that big carbon sink is going to destabilize and wobble like a top, and burn and crash. Is that okay? I'm not sure.

I'm not telling you a rhetorical tale, I'm asking the question that we, managing your public lands, need to ask you, where do you want your carbon to be, in what form, and at what time. Because that's the implication. Every management action we take this week, this summer, next year, is 22nd century forestry, among other things.

So we are now doing what you'll see, if you're around 100 years from now. I plan to be here. I plan to be skiing in Kirkwood, actually.

(Laughter.)

DR. NECHODOM: Just for a quick little comparison here, and I'll be done. What you see here is the difference between counting harvested wood products in bioenergy, and our bioenergy calculator is really a percentage, it's not precise. This is a study that needs to be extended.

But if you note that without counting those pools, which are real, harvested wood products are real. You're sitting on some of them right now. If you don't count those, and count the bioenergy, you end up with a much lower carbon value.

So compare these two and this is a question, again this is not rhetorical, it's simply this is an accounting issue. It is not a science issue, it's an accounting issue. If you are really interested in the full accounting of the carbon and where it is and in what form, you have to ask yourself what pools you're going to count and how long you're going to count them.

Now, these are all six scenarios. You're welcome to see this one. It is released from the Forest Service.

But this is, to me, the big macro picture. All the arrows going up are basically the natural and the carbon emissions from, you'll see on the lower right, the fossil fuel emissions.

The net result is somewhere roughly on an annual basis, 220 billion metric tons.

We suck up somewhere about 205, so we leave a bunch in the atmosphere. And now when we talk about emission reduction and sequestration, we're talking about tweaking the pumps at the margin here. Five billion metric tons is a lot. Waxman-Markey has 2 billion; 1 billion international, 1 billion domestic. What are we talking about?

Again, I'm not being rhetorical, I'm just asking the question that I ask myself all the time: What are we trying to do here?

Our carbon markets may be a good way to do this allocation of scarcity, I don't know. But I do know that whatever we do, it's got to be real, absolutely real. We feel very strongly the obligation, I know you do in state government, as we do in the federal government.

And we're spending taxpayer dollars, or we're playing games with big money, we'd better be accurate. These are not indulgences. These have to be real verifiable tons. And that's just in the carbon markets, to say nothing of species banking, wetlands mitigation, et cetera.

So, that's the end of my story.

(Applause.)

DR. KAFFKA: Thank you. Some time for comments.

MR. BELLANCA: Hello. My name's Ryan Bellanca; I'm with Placer County Resources Conservation District.

I was just curious, what is a small tree to you?

(Laughter.)

DR. NECHODOM: Twenty-one inches minus. That's what it says in the Sierra Nevada. That's a great question. And I think if you're not leading to it, I'll go ahead and lead you to it.

What we have used is tree diameter as a proxy, a very clumsy proxy, to talk about what we mean by sustainability. It was mentioned earlier that we have the limit in EISA, the Energy Independence and Security Act of 2007, that says no federal biomass shall be used to meet renewable fuel standards.

And what we really mean, and what is really meant by the people who are proponents of that, is we want you to give us metrics of sustainability in the forest.

Now, you tell me, is limiting things to a 21-inch tree that proxy? I don't know. I suspect not. It's a good question.

MS. FALL: Carol Fall, UC Cooperative Extension, Trinity County, which is about 60-some percent Forest Service.

DR. NECHODOM: Eighty-seven, actually.

MS. FALL: Well, that includes private, not industrial.

DR. NECHODOM: Yeah, public land, yeah.

MS. FALL: I wasn't clear how you were actually accomplishing the biomass extraction in your B-to-E model, because your costs of extracting material exceed what you're selling it for.

So on a boots-on-the-ground kind of way, how do you accomplish what you were trying to get at? I mean are you subsidies, changing regulations, how are you making that difference in costs so that people can actually get to where you want to get.

DR. NECHODOM: Right. It's an obvious and good question we aren't real clear about. We didn't actually model any subsidies because our economic model did not take into account things like production tax credits or Jason Orta's grant program or whatever.

What we do, though, is actual cost based on the actual equipment deployed. And, again, we had 13 different prescriptions, so on the public lands there were two types of thinning operations. And we essentially amortized the debt of the equipment and the lifecycle assessment.

We look at all the fuel inputs. We have some calculators for offroad diesel cost, red diesel, et cetera. So all of those go into it. And that's what shows our costs being so high.

And when we showed that to many of the people in the biomass industry or in the foresty industry, they said, yep, that's pretty much what we see out here.

Now, what the difference is, how fuel buyers are able to go out and actually go to a stewardship project on federal land and say, I'll buy it for 25 to 45 a ton, you'll have to ask the fuel buyers, because we think their cost structures are a little bit different than a brand new biomass plant.

DR. KAFFKA: Thank you very much.

(Applause.)

DR. KAFFKA: Our next speaker is Tom Christofk. I hope I pronounced that right, Tom. Tom is an air pollution control officer for the Placer County Air Pollution Control District. He's been there since 2002. And he's been -- he served as the district's general manager since 1999, as well.

He's worked in Placer County at other jobs during that period, as well. And worked on both, he was also planning section chief, incident command team for the California Division of Forestry and Fire Protection, as well. So, very broadly related to forest resources.

He was in the Marine Corps, served his country for quite a few years. And then also held positions with Ford Aerospace as both communications, as training section supervisor, project manager and marketing manager for various technology programs.

Tom.

MR. CHRISTOFK: Thank you. Appreciate the opportunity to share some of the things that are happening in the Sierras with you. I was asked to talk a little bit about barriers and challenges. And actually what I wanted to do was to give you some practical boots-on-the-ground experience dealing with the economics of the programs that we're undertaking in Placer County. And then get to some comments on barriers and opportunities.

A little bit about our district. I am the regulator, or a regulator, not the regulator, a regulator. So my perspective is a little different. But an air district, and there's been a lot of comments about air districts today, my air district, or our air district is actually governed by local officials, as all air districts. And there's 35 of them in California.

And the governing board is, in my particular case, three county supervisors and six elected members of each incorporated city.

Placer County has three air basins. We span from this valley, Sacramento Valley, up through the mountains into the Lake Tahoe Air Basin. Placer County has three-fifth of the lakefront.

And the kinds of programs are on the screen here, typical programs you'd find from a regulatory agency. What really is the key is the last bullet there which is the open burning management. Under state law, air districts manage open burning.

And in the case of Placer County we have a fairly healthy agriculture industry. And about half of the county is forested. A lot of that is federal lands. There's three federal forests in Placer County. And they have, as Mark just indicated, high-value private property adjacent to those forests. And we have had a very significant recent history of large fires, most recently last year's American River complex fire.

So, the county is typical for the Sierras. It's a lot of development pressure. The Lake Tahoe area is prone to some high-value resorts and at risk.

So why would an air district even get involved with this business of biomass? Well, if I look at air quality it makes a difference when I look at open burning versus control burning.

So, based on simple emissions, and I'm talking here criteria pollutant emissions, these pictures show you, and this is right out of AP-42, EPA guidelines, that if I had a ton of material in a forested environment, and that ton of material went to an open burn, the emissions are down on your lower right. And notice the scale, the scale there is zero -- should be 20 to 200 pounds.

If I diverted that product to a controlled environment, and this would be basically a simple direct combustion biomass facility, notice the scale there. You get a fairly significant, like 95-plus percentage reduction on particulate matter. A huge reduction on carbon monoxide. About a 60 to 70 percent reduction on NOx. And a huge reduction on hydrocarbons, not to say the toxic side, too.

So, that tends to get my attention, especially with an air district that is linked to the Sacramento Valley, and is, in terms of designation and classification, nonattainment for the ozone precursors, about to be designated nonattainment for PM2.5. And has thresholds, and we'll talk a little bit about new source review in a little bit, as tough as they get in the state of California. So, if I can reduce those criteria pollutant emissions any way, it makes sense.

So let me talk a little bit about how to do that, because I am also a market-based regulator. That sounds like an oxymoron, but, in fact, I think there is a solution here.

I've been looking at forests as a solution to the air quality problems for quite a long time. And the problem with it is it's upside down economically. There's been a number of comments about that today.

So how do you go about economically dealing with the forest issues in a way that has environmental and public health benefits. And I was very pleased to see Mark's presentation because that's kind of where I'm coming at from a different area.

If you manage our forests in a different manner, and you value those things that have not traditionally been valued -- and when I say value, I do say put some sort of pricing mechanism on them -- you get a lot of benefits: the renewable energy, the greenhouse gas reductions, air quality enhancements, forest health improvements, what I would call ecosystem, and wildfire risk reduction.

And so that's really the basis of the program that we're kicking off in Placer County. And it's actually been quite successful.

Now you've heard this morning some of the existing policy drivers that are kind of lining up. There seems to be kind of a convergence of policies, both at the state and federal level, and things that are happening on the ground that may make this actually work.

And it's the market and economic factors that, I think, coming into play here. And I'm going to talk a little bit about these.

But I want to show you some of the initiatives that we're actually undertaking on the ground in Placer County to shift the economics and shift the dialogue.

Traditionally, forest management has been handled with two methods if you're looking at wildfire reduction. And that is using fire as a tool or using mechanical means as a tool.

And using fire as a tool, prescribed fire, there's lot of those happening. My agency and agencies like mine permit prescribed fire activities. It's a fairly significant resource drain on my agency. It's a fairly significant resource drain on the land burners, because they file smoke management plans and there's a lot of resources that go into managing a prescribed fire.

On the other hand, there's another whole method of mechanical treatment which is dealing with the community wildfire protection plans. And you go in and you do mechanical fuel breaks, you do chipping and all that.

Both of these methods are good. They're solid and they actually do result in reducing the fire risk. But they are both very costly.

What I've just dropped down the screen here are some of the initiatives that we have undertaken in concert with the County of Placer, and I might say that the air district is not the County of Placer, we're a separate governmental entity. But we have joined, recognizing the risks and the opportunities. So the Placer County and the Placer County Air District are, in fact, joined at the hip on this particular one.

And I'm going to talk about each one of these things in just a little bit. But, these are new initiatives that are trying to shift the economics so that we don't use taxpayer money to reduce fire risk, and actually harvest some benefits.

And then there's some pure science and pure engineering that I'm going to talk about here, as well. And then kind of ending up with the monetization. How do we monetize, you know, what we gain from either avoiding a fire or from reducing risk.

So let me start real quick with this one. What we did is, again, going back to the basics, economics. We had some action that we took against a fairly large timber firm, and that resulted in a settlement of which part of the money was put into what we call a supplemental environmental project.

And that is that rather than deal with a straight penalty, we work with the owners of this particular business and we set aside some money to take a look at biomass and see how we can learn the economics of can it be at least, we just wanted to know what the differential costs are. And we validated this.

So, we took existing piles in the Tahoe National Forest. This is up above Foresthill area. And these were existing piles that were already permitted to burn. So a huge number of these piles that we had issued permits on. And they would have been burned in the next year or two.

And we decided not to burn them. We decided instead to process them into fuel and transport them down to the Sierra Pacific Industry mill and cogen facility in Lincoln. It's about a 60-mile trip.

And we cited it at about 10,000 green dry tons that we wanted to move. And here's some of the data. We actually fixed this test case at $55 a bone dry ton to do the processing and transportation. And the fuel at the mill was $30. So we were losing 25 bucks a ton. We knew that going in, but it was set by contract. But we wanted to study the emissions, and we wanted to study the cost.

Okay. So, here's real-world data, kind of mirrors that first chart that was out of the EPA AP-42 guidance. So these are real numbers that we got in terms of emissions reduction. And this was from running actually the first 4200 bone dry tons.

Pretty impressive numbers from an air quality guy. So any air quality guys around here, you definitely do get a benefit shifting from burning in the open to a controlled biomass-to-energy.

And we included in this the transportation and the chipping. In other words, you had a large grinder out there, all the haul trucks and everything. So the accounting is pretty cool.

Then we took a look at the greenhouse gas benefits, if you will. Now, when you burn in the open and you burn in the biomass facility you get the same CO2. So there's really -- you know, the accounting is somewhat difficult. But what you have done is if you burn it in the biomass facility to create electricity, you're offsetting a megawatt of fossil fuel use. So that's the basis of that grid electricity, if you will, and the benefit of the carbon. So that's the accounting on the carbon.

Now, let's take a little bit of the cost. The top diamond, and this is a chart that one of our engineers worked up, and he really tried to define what is the cost effectiveness of the carbon.

So, I gave you the parameters that it was a $55 cost to process and transport the fuel, and we got $30 at the gate at the biomass plant. So we were losing 25 bucks a ton.

So, if you take that diamond, the blue diamond, and come straight across you have to get -- if you wanted to go revenue neutral, you'd have to get $48 a ton per carbon on the open market to make this nonsubsidized.

So either you have to get your efficiency higher, in other words you have to lower your $55 a ton down to 50, 49, or you have to increase the value of the fuel. And the lower red chart is basically, let's just say we got $40 a ton for the fuel. If you take the $55 cost of doing the work and you got $40 at the mill, you're basically only losing $15.

And you take that line straight over and you, all of a sudden, find that your carbon on the open market, if you could get it, would only need to be $28 a ton.

In fact, what we learned in this is that the fuel value of the product that came out of those slash piles was so good that in the open market, if it wasn't a controlled parameter, that the value of that fuel was actually 48, 50 bucks, 55 bucks. The same operator's paying $55, $58 a ton at another plant.

So we're not that far off on the economics. Now, what does that tell us? It tells us that theoretically if you could put smaller plants distributed locally you might actually do much better. And if you get more efficient on your processing and transportation, you could actually come out quite well, too.

But what I look at is I look at the carbon value. And I call that the WD-40. Because if you could, in fact, get a value of that carbon at some number that's, you know, between the 3 and the $20 per ton, the economics, actually with the current infrastructure in our area, would work.

And, of course, what you need to do is you need to have an accounting protocol that values that.

Now, the benefits to the watershed are here. Just, you know, a few examples of the picture. But the reality of it is staggering, the benefits of having treated this landscape by not burning those existing piles. And the value of this particular stretch, it is called the SSO area, they then went in after this treatment and did a small prescribed fire, really low intensity. And with the latest rains it's just been phenomenal. So the entire area there is huge.

And so that was our little cost model, our little pricing model or our little, you know, evaluation.

So I go into now a protocol. What we did then is we took this data and we said, we got to look at the carbon. And, as you know, there are a number of carbon protocols or forest protocols already adopted by, a couple by the ARB. And with, and it's no longer CCAR, but the registry. There's a reforestation and conservation protocol that's been adopted, as well as an urban forestry protocol.

My district has committed to develop a biomass-to-energy, and there's the word waste, and I apologize for that again, a biomass-to-energy. We've drafted BACT protocol, and we are now actually on version three of that protocol. It's been discussed with many of you in this room. We've had a lot of input, a lot of interactions with agencies like the California Energy Commission, utilities, Resources Agency. And that particular protocol I'll talk about in just a little bit.

We are also committed to two additional protocols for carbon accounting, one of which is actually with Mark Nechodom's shop, on what we call avoided wildfire emissions. So that if you get an avoided emission, can you calculate that carbon. Or, if you can essentially enhance your forest growth, how do you calculate it.

And I'll go real quick on the biomass waste-to-energy. Basically burning in the open is your business-as-usual. And accounting with the transportation and processing and fuel energy at the biomass plant, it's basically a calculation pretty simple. But it's done in a text book fashion. We have copies of that protocol if you would like to look at it.

The other two protocols I just mentioned that Dr. Nechodom is working on with his team include quantification of the wildfire reduction and the size and intensity. And then the forest growth enhancement. We expect those protocols to be developed once we get the scientific data sometime towards the end of 2011.

In terms of CEQA, how would we use these credits? Well, right now it's a voluntary market. We have developers in Placer County that are looking to make a statement with their project to offset their impacts from greenhouse gas.

We would use the credits that are developed from these projects to direct credit offset their impact.

Bioenergy facility development. Let me real quick talk about another exciting project in the county. Within the basin, Lake Tahoe Basin, we got a DOE fund to essentially establish a small 1 to 3 megawatt facility in the Kings Beach area.

We're looking at three technologies, combustion, direct combustion, gasification and pyrolysis. And currently we just received an earmark through the recent stimulus fund for about another 1.5 million to move that project along.

And that project is scheduled to actually break ground in about 2012. So that will be a 1 to 3 megawatt plant, combined heat and power, in the Tahoe facility.

I'm going to skip this. And I want to real quick talk about public health. Part of this is the public health benefits. We're also funding a direct project to try to model the benefits of avoided impacts on humans. And we've contracted with UCLA School of Public Health to essentially go back and data mine hospital admissions records; take a look at those admission records; correlate it to the air quality data.

And come up with a model that if you had a benefit in the air quality, could you avoid the impact from a human health perspective. That's leading to some pretty interesting data, especially when it deals with wildfire issues. Because some of those high spikes line up with when we've had huge wildfires. And so avoiding those wildfires will hopefully lead us to a direct benefit in terms of public health.

Challenges and opportunities. I'm not going to beat this up, but there are a lot of challenges. On the air permitting side, I don't think it's as big a challenge as it used to be. And in terms of my agency I've got a board-approved set of directors that are basically saying to me, find a way to get it done. And I think that's very encouraging.

I want to leave with one last slide, and this is a simplistic perspective. And I've used this actually in Washington, D.C., on The Hill, when I was briefing this project. And they actually got it, so it's "Dick and Jane". But I think that's the way you do it.

So you got this ton of material here in the forest. And you got red dollars. In other words it's going to cost something to deal with it, whether it's going to be a prescribed fire, or whether it's going to be lit off in a lightning strike. So somebody's going to spend some money, or it's going to have some kind of problem. You're going to have to dispose of it some way.

And there's the air emissions that are going to happen. They're fairly significant. Let's just say, give that an alternative path, a different life, you know, cycle.

So you've got a processing of that product. There's a capital investment there. You've got a facility to deal with that. There's some dollars there. So you got red dollar signs all over this chart.

The difference is, out of a biorefinery, a gasifier, electricity, lumber mill, whatever, you actually get, hopefully if it's done right, you get some green. You get some dollars. You get some products, you get some resources that could be used.

Now, again, from an air guy, you get some benefits from a emissions reduction perspective. And that's that quantification. And beyond that, you get this whole thing that I think Mark was just talking about. You get all these other benefits, which are quantified there, beyond just air.

And so could you, in fact, develop a carbon market and a criteria pollution credit? The answer is yes, you can. And it is potential. It's going to take a lot of work. We've taken the first step to knock that, and I think we're being somewhat successful in that effort.

Thank you very much.

(Applause.)

DR. KAFFKA: Comments or questions?

MR. SKYE: Coby Skye from Los Angeles County. I was just wondering if you'd thought about increasing the cost for the permit for the prescribed burns in order to also decrease that differential.

MR. CHRISTOFK: Yeah, that's a great question on the permits. We charge by acre. And by increasing the cost of the permit to the agencies that typically burn, and a lot of them, those are public agencies. What they'll turn around and tell us is that they can't do the burn because they have a limited budget of B&D dollars.

So we have looked at that, and that's very difficult to increase those kinds of costs.

MS. HAMMEL: Hi. Thank you. Debbie

Hammel, NRDC. I have a question about the remediation and the reliance on that material in terms of the development of infrastructure and facility siting.

Assuming that we do decide that we're going to use remediation as a means to source material for these facilities, and we make the investments to locate these facilities and in an efficient way, so that they're close to where the remediation is occurring, how sustainable do you think that that source is going to be?

I mean remediation, by definition, is short term, relatively speaking. So what happens when you run out of that material from the remediation and you're sited close to the forests rather than, for example, close to the central valley where you might want to be sourcing ag residues?

MR. CHRISTOFK: Right, that's a great question. So, what you have to do in your siting you have to size your facility to the available sustainable feedstock. And you do that first. In other words, the feedstock would be from approved projects that already in the queue, so to speak, for forest management.

And I'll give you a perfect example. In the Lake Tahoe Basin right now there is an approved management plan to treat 10,000 acres per year for the next ten years. Essentially going in and treating the landscape for removing the excess fuel.

So what you -- in fact, what we're doing is very carefully sizing the facility. That's why I mentioned a 1 to 3 megawatt facility. You'd size it to be able to use the material that would otherwise have been piled and burned.

So, in other words, you would not site a plant essentially to clear the forest for any other purpose than to manage that forest for the benefits. It's not the other way around.

And, in fact, in the protocol that I mentioned earlier, that is a key component, is that every bit of that would be already through existing NEPA or CEQA constraints.

MR. STANGL: Just a quick question. I wondered if you considered -- you know, if you went to like a 500 kW gasification system, I mean it's mobile. I mean you just plan its three-year payback. You pick it up when you run out of fuel and you move it to the next spot down the road.

MR. CHRISTOFK: Right. Part of the challenge there -- and that's another great question. We've actually, I think, looked at that to some extent, mobile plants. The problem is the grid tie. You know, hooking that up to the grid.

And so in the case of the Tahoe facility, which we're very excited about, is it's going to be put in concert with an existing load stabilization power plant in the Kings Beach area, which has problems as it would in terms of making sure there's reliable power within the basin.

We've had challenges in the basin in the past, and so as a component of the -- and we hold the permit on that facility. So as part of that permitting process, expanding that into the renewable side, I think, is actually going to provide more reliable power, baseload power, to the basin.

MR. STANGL: Um-hum. And then my other question was the economics. If you go with the distributed generation model, I wonder if in the analysis that you showed earlier, you looked at, in fact, instead of losing the $25 or $30, or whatever it was, a ton, where you're actually offsetting a retail power load locally.

MR. CHRISTOFK: Yes. Actually, yes, we have. And that's actually part of it. And those documents, by the way, that's another great question. This is all about economics.

On the pro forma for the Tahoe facility, in particular, we are looking at the specifics of each of the direct combustion, pyrolysis, or gasification side.

So, yes, on a translating out on a kilowatt-per-basis, yes.

MR. FUDEMBERG: Yeah, and so how -- Jay Fudemberg, power developer -- how willing are you or what permission do you have to engage in a ten-year contract with a commercial firm? What's the term, contract term, that you would be allowed or permitted for a nonstate player to come in and construct and operate under remediation?

MR. CHRISTOFK: Right. But let me describe, first of all, we're the government, right. Or at least in one sense a little pissant government, but we're the government.

(Laughter.)

MR. CHRISTOFK: And we're here to help.

(Laughter.)

MR. CHRISTOFK: But we are not in the

power business. So we have no intention of owning or operating. We'll take a public interest in this facility, if I can answer your question. But, in fact, we've got an equity partner that we signed an MOU with that will effectively take this project and do it right. I mean the history is government really shouldn't be in that business.

And we would sign a fairly lengthy agreement. Because the other half of that one facility is we are also going to get the power for government facilities up here, and the heat of that will be very beneficial for snow melt and things like that in the Tahoe area.

MR. FUDEMBERG: So are you willing to go ten years? I mean --

MR. CHRISTOFK: Absolutely.

MR. FUDEMBERG: Okay.

MR. CHRISTOFK: Yeah, we -- okay.

DR. KAFFKA: Thank you. Thanks, Coby, again.

We're going to ask at the end of the -- thank you.

(Applause.)

DR. KAFFKA: Later this afternoon we're going to ask all our speakers to join us again in a panel discussion. And we'll go till we really need to go for the ethanol. So we'll have a chance, those of you who haven't been able to ask questions, to do that.

Our next speaker is Coby Skye. And we don't have a long biography for Coby, but I think it's a very potent one, actually.

He's a civil engineer, and he works for the Los Angeles County Public Works Department. And he has a big job. He oversees environmental policy and compliance issues for L.A. County Public Works. And also oversees the emerging technology sector for that agency and organization.

So that directly affects, I think you said, 10 million people. So, Coby, thank you.

MR. SKYE: Thank you very much. First, I just want to say it's great to see a good turnout. I know it's very tough to get travel budgets and travel requests approved. Actually, if anyone asks, I'm here on vacation in the beautiful Sacramento Valley Delta.

(Laughter.)

MR. SKYE: It's also good to see a lot of speakers talking about the need for public/

private partnerships and to make sure that all of these projects need to be economically viable. And I'm going to talk a little bit about the project that I'm working on from that perspective.

Just a quick outline of the speech today. I am going to talk about the challenges that we're facing in California, and how conversion technologies, these are technologies that deal primarily with trash, so I'm going to use the waste word for the material that we're focusing on.

But it's really the residue. We use the term post-recycled residual solid waste. And how L.A. County has approached tackling that waste problem in a unique way. And how we're overcoming the barriers.

Just a quick snapshot. In L.A. County it's over 10 million residents. Our disposal numbers are down; I'm sure they are down everywhere. We're only disposing now 11.4 million tons of trash that's filling the Rose Bowl, as some of you know, a large stadium in Pasadena, 32 times every single year, just with the residual solid waste that's left over after we recycled, after we've reduced to the extent that we can.

And it's basically the same amount or more that we've been disposing every single year since 1990 when our AB-939 mandates came in. So the bottomline is we need to be more sustainable, we need to do something better with all of this trash.

We also are facing the closure of Puente Hills Landfill. It's the largest operating landfill in the country. And it handles about a third of the waste in all of L.A. County. It will shut down in 2013. And also handles about half of all of the green waste that's generated in L.A. County.

So you can imagine an urban area in southern California. There are not as many options to deal with the green waste that's collected at the curbside. So we rely on our landfills for alternative daily cover. And the largest landfill in the area, obviously, handles a large market.

We don't have good solutions for what we're going to do with the waste once Puente Hills closes. We have a waste-by-rail system, but it's only permitted to take about 8000 tons per day. And even that amount obviously doesn't account for the closure of the Puente Hills Landfill. And it's going to be very challenging to meet even half of that capacity through the waste-by-rail system.

So in a worst case scenario we may be stuck exporting 80 percent of that 11, 12 million tons of trash that's left over if we don't do something differently.

We're also dealing with some significant new regulations in solid waste, landfill system post-closure maintenance. The state of California came out with a report not too long ago that shows the long-term post-closure maintenance liability can be in the billions of dollars. And taxpayers will be stuck with that bill.

So there's so many reasons to move away from landfill disposal. And we do need to do something differently with our waste stream.

And obviously in California these numbers are different, but in the nation we still have landfills as the largest source of methane emissions as a cause of greenhouse gas emissions. So we want to do something better.

We've been researching conversion technologies for over five years in great detail.

We've identified hundreds of different companies from around the world, dozens of different technology types.

And what they all have in common is that they're able to take trash, convert it into something useful. That's a huge benefit. There's thermal, biological and chemical processes. We distinguish conversion technologies from traditional waste energy, which is combustion of the waste to produce steam, and thereby create electricity.

And we've also seen that a lot of countries around the world are already using these technologies. For a variety of reasons, there's no commercial trash-to-energy conversion technology project within the United States. We hope to change that.

These are just some sample slides of what these technologies look like. And they vary significantly.

In our research of conversion technologies we found that they're not just great in reducing the amount of waste that we're sending to landfills, which is very important, but we're also able to produce energy and fuels and other products from that waste stream, which otherwise would be lost pretty much forever in a landfill.

We're able to promote energy independence from foreign oil, create jobs. The economic development aspects of conversion technologies has now been taking center stage as we've been grappling with our current economic crisis.

And just like we saw in previous slides, significantly reduce air emissions across the board, criteria, toxic and greenhouse gas emissions, turning a liability into a valuable resource. And that's very important.

We've also seen a lot of statewide initiatives that directly tie to the use of conversion technologies better utilizing our biomass resources. AB-32, the renewable portfolio standard, or the low carbon fuel standard, the bioenergy action plan. All of these goals, you would think that California would be jumping all over these new technologies, building facilities left and right. Why haven't we seen it? And that's what I want to talk about, some of the barriers.

Our approach has been to develop

demonstration projects. We know that there is a lot of questions about these new technologies. And we feel the best way to answer them is get a facility up and running, get the emissions data, have it available so that regulators, decisionmakers, the public can come and see the facility, understand how it works, and not be as concerned about it.

We also need to make sure that we verify that these projects are technically, economically and environmentally viable in California. Just because they work in Europe or in Japan doesn't mean that they'll actually be successful here. We want to prove that they are.

Again, we see the private/public partnership model. We don't believe that L.A. County should be in the business of creating or building or operating biorefineries. But we do see a significant public benefit in advancing the development of these technologies. And we've been very active in doing that for over a decade.

The main obstacles. Cost is definitely one of them. New conversion technology projects certainly have a large upfront cost for development. And landfill disposal is still relatively cheap. That's a real problem and a disincentive for new development.

We also have misconceptions about the technologies. That they're highly polluting; that they're just another form of incineration; that we're somehow creating these environmental catastrophes.

And so we have a public outreach contract dedicated just to answering those misconceptions, proving to the public that all the information that we have, all the independent studies that researchers have done show that this will not be the case.

And obviously with air regulators that we have today, they will not get the permits in order to construct facilities if they don't meet very strict environmental standards.

And the last is one that we should be able to address, and for some reason have not been able to for ten years, the regulatory hurdles. There's currently underway a legislation that I'll talk about that will help some of these issues.

We have, right now in state law you can only have disposal transformation, and all of these new technologies are kind of lumped in under the disposal category. We really need a clear permitting pathway and allow these technologies to have an equal playing field.

We do have an issue with terminology. People hear terms like transformation, biomass conversion, advanced thermal recycling, and different technology types, pyrolysis, gasification, et cetera, and they don't know what to make of it.

And that's why we've been trying to use the term conversion technologies specifically for processes that deal with municipal solid waste. And biorefineries for the broader category of technologies that may deal with other biomass resources.

L.A. County has been on the forefront of tackling the legislative issues, as well. Since 2000 we've been sponsoring or supporting legislation so far with zero success. The primary problem has been the Assembly natural resource committee, which has been very effective in blocking any legislation that changes the status quo.

AB-1090 was one of the more recent attempts. We have over 100 attendees overwhelmingly in support of commonsense legislation that would clarify these new technologies. And unfortunately the bill still died in committee.

We're currently working on a new bill sponsored by the Bioenergy Producers Association, called AB-222. It has a great bipartisan list of co-authors, five Democrats and five Republicans including Assemblymember Ma from San Francisco.

We recently -- addressing hostile amendments that came from staff in trying to undo the damage that the status quo in Sacramento doesn't want to see these kinds of changes. And we often talk about what the challenges are for these new technologies, and we pass the buck.

We say, well, the legislature has to act or do their job. But all of us in the industry and as regulators and as local governments have to push back. We have to say that the status quo can't continue, that we can't just rely on trying to work around unrealistic and unreasonable regulations and legislation.

So I hope that all of you will write letters with regards to AB-222, and request that commonsense legislation will be enacted that will clarify these regulations in the future.

We really believe that these new technologies can open up huge possibilities for tackling some of the largest environmental challenges that we face as a society, as humanity, in the world, especially greenhouse gas emissions. But also creating sustainable energy for future generations.

And if we're successful California will be looked at as a model for other states and for other countries. We want that to be the case. We want new, clean technologies to be widely developed throughout the state. And we hope that our demonstration projects can be a model for other jurisdictions.

I definitely encourage you to visit our website. We have great information, some fact sheets, copies of all the reports that we've developed to date. And it's a great resource. You can sign up for our newsletters and get up-to-date information about our project.

I'll be happy to answer any questions you have.

(Applause.)

MR. FUDEMBERG: Sorry for dominating the

mic. Could you just talk a little bit about who would be against such legislation, what their motives are, and who's supporting them? And maybe even some names?

(Laughter.)

(Applause.)

MR. SKYE: Well, if you think about who has vested interest in the current status quo, probably landfill operators and, to some extent, recyclers. It's really kind of like the petroleum industry. There are some companies that have realized that we need to shift and they're investing in renewable energy at the same time that they're trying to quash carbon taxes or other regulations.

The same thing is happening in the waste industry. It's very lucrative to get paid to pick up trash, put it in a hole and bury it. And they want to continue to be able to do that without competition and with as little regulation as possible.

And there are very large waste companies that are multinational conglomerates, and we recognize we have an uphill battle. That's why we definitely need as much support as we can get.

MR. MATTESON: Gary Matteson, Mattesons and Associates. We've just been through a discussion of this in Sacramento, as you may know. And I'm not certain what the final verdict, or what drove the final verdict, but I know they rejected it. Namely to stop hauling all the Sacramento trash over into Nevada.

But could you speak to the I guess, quote, $64 question that they kept not answering, and that is how do you avoid the tars and how do you avoid the concentration of toxics in all the combustion processes that seem to be available at this time?

MR. SKYE: Hopefully I won't get into one of those four areas that bore people to death. But in terms of the technologies, the reason that L.A. County, one of the many reasons that L.A. County's focused on conversion and especially thermal conversion rather than the traditional waste-to-energy is that if you're not combusting the waste directly, if you're cooking it, breaking it down, depending on the technology, of course, you're able to then clean up and otherwise process whatever that intermediary product is. Usually a synthesis gas or maybe some oils or pyrolysis oils, as well.

And then create a final energy product that can be electricity, it could be fuel. And so the ability to do that before you actually combust the waste material is the reason why the new technologies are more effective. They're much less polluting. They have an easier time of reducing the emissions.

In Europe where you still have a lot of waste-to-energy facilities, about half of the capital cost is in air pollution control to try and contain all of these emissions. And that's why they've been able to continue to build new waste-to-energy facilities.

We'd rather invest that in the technologies that can create new fuels out of this synthesis gas or do other things.

MR. SHAFFER: Steve Shaffer. I appreciated how you highlighted the importance of public information and outreach. We heard Eileen Tutt at lunchtime talk about the importance of environmental justice issues.

Can you describe those efforts a little it? That has seemed to be one of the ongoing barriers, as well, is bringing along and informing the environmental justice community.

MR. SKYE: That's a great question. We live in an area where environmental justice is sometimes a barrier to any form of progress. And you know that from developing any type of facility, especially anything that has to do with solid waste.

If it's a recycling facility, if it's a new composting facility, if it's conversion or even if it's a library, any type of development you're going to have residents and activists, and especially environmental justice folks, that will line up in opposition.

And the importance of getting out in front, being proactive in addressing concerns and comments, especially from the residents that live in the community where we're trying to develop these facilities, is vital.

I think that's a testament to the approach L.A. County has taken. We identify the sites long before we pick the technologies. And we are able, then, to talk to the community and get their feedback. And there are now stakeholders in our process in siting the projects and in moving forward.

We're also going to be developing showcase facilities and being very upfront and transparent about all the information, all the impacts that will come with these projects, as well as the benefits.

The other thing is we need to start highlighting the significant net environmental benefits from using biomass resources to create energy and fuels. One of the big ones is in co-locating the recycling facilities and conversion technologies, we're taking diesel trucks off the road in the communities that currently site these recycling facilities.

And so you have an additional net decrease in criteria pollutants and diesel particulates and all the other things that the community already hates.

And so hopefully we can show that not all new facilities, not all progress necessarily is detrimental. We can be moving forward developing new facilities and actually cleaning the air and being better stewards of the environment.

MR. MONROE: Ian Monroe, Stanford University and HDR Engineering. I'm curious how important do you think it is to adjust the definition of renewable energy allowed and renewable portfolio standard to allow for conversion technology to be more easily incorporated in terms of the percentage of biomass that's going into the conversion technology.

MR. SKYE: I think it's very important. Again, it's because we need those private and economic drivers in order to get these projects successfully developed.

Years ago we had a lot of discussion about diversion credit. Do these facilities count as disposal or do they count as diversion. We recently had a law that basically made that discussion irrelevant because we're now talking about disposal reduction, reducing the amount we're sending to landfill.

Should have been the focus all along because in all of our recycling efforts we've pretty much just created a status quo. We've diverted the growth, but we're still sending as much to the landfills now as we were almost 20 years ago.

So the new discussion is definitely centered around renewable energy. And if these projects can be qualified as renewable energy, they can open up the potential for these projects to be economically self sustaining now rather than waiting until energy costs are spiking again, and landfill costs are spiking because we don't have anywhere to take our trash.

We don't want to wait until it's pretty much too late, and we still need five to ten years to develop these facilities in any substantial way so that they can make a dent in the amount of waste that we're disposing.

MR. MONROE: What political forces are currently pushing back against changing that definition? Is it the landfill operators and recyclers, again? Other forces, as well?

MR. SKYE: Yeah, and it's primarily on the waste side. We don't have as much pushback on the renewable energy side. Actually the utilities are pretty much unanimously in support of additional options to create renewable energy and meet the renewable portfolio standard, which they want to be able to do.

MR. MONROE: Thanks.

DR. KAFFKA: Thanks, again. I think we'd better -- well, one more comment.

MR. HOLLEY: Just quickly, thank you for the extra time. Pat Holley with Covanta Energy. We do operate a large-scale municipal solid waste-to-energy facility in California.

And I just wanted to comment to the group, I think I saw an impression that somehow municipal solid waste-to-energy is dirty, or has got some very negative effect on the society.

Exactly the opposite. These conversion technologies, including our own, are high regulated. We meet emission standards established by CARB and we meet BACT requirements in the state. Very tight emission limits. Very carefully monitored.

We also avoid putting the trash into the landfills, which is something that's undesirable and communities are working to solve around the state. We also avoid a ton of CO_2 equivalent for every ton of municipal solid waste processed. So just wanted to make those couple of quick points.

Talking about your process and your evaluation of where you go from here, do you anticipate any commercial request for proposals in the near future, or where do you head on that?

MR. SKYE: Good question. And I'm glad

that you clarified, because I was not intending to say that traditional waste-to-energy is bad or negative or polluting. Just that we feel these new technologies are even better.

We have three operating facilities in California that convert trash, and primarily the reason that we didn't have more is because of public perception and environmental justice activists that, in the late '80s and early '90s, killed a lot of projects.

MR. HOLLEY: Yes, and just one additional point on that. In Europe where it is widespread and where the technology is endorsed by the public agencies, it has grown. The capacity has grown. They meet new requirements, very efficient, very modern facilities.

MR. SKYE: So, very briefly because I know we're short on time, the next steps for L.A. County, we are planning to go to our board of supervisors in the next month with a recommendation for our demonstration projects.

We've already identified the technologies that we want to partner with. And beyond that we're looking already at the next phase. We call it phase four of our project, which will be commercial-scale projects that we want to look at.

Just reopen the process for all the technologies, and get commercial-scale projects in L.A. County. Start making a dent in our waste stream.

(Applause.)

DR. KAFFKA: Thank you. Our last speaker before the break is Nettie Drake, Nettie is the owner and operator of B&N Enterprises, which is an ag resource management company.

She's worked quite a bit in production agriculture for both livestock and crop operations, and has been involved with regulatory compliance production agriculture in the San Joaquin Valley for 15 years. That must be quite a job.

She's worked with rangeland crop and animal production operations in developing on-the-ground projects to address regulatory compliance, primarily air and water regs. And more recently she's been working on dairy digesters and dairy-related projects.

So, Nettie, thank you.

MS. DRAKE: Well, thank you for allowing

me to come and speak today. As you can see, I have worked in this regulatory compliance -- one clarification I want to make is I was born and raised in production agriculture. I worked with production agriculture only because there are a lot of new regulations and it's not a world that folks who live on the farm or live on the dairy are familiar with.

And with my background I'm able to help clarify, and hopefully make it a little bit more -- a little easier for them, but not necessarily easier for the regulators. So for those of you who are regulators, I apologize for that.

Essentially we're going to talk primarily today about the dairy industry in California and its impact or its role in renewable energy production in California, particularly the San Joaquin Valley.

As you can see, here in the valley, if you haven't already heard, we have a lot of dairies. We have a lot of cows, and we have a lot of emissions and nutrient value that we need to address and deal with.

And the goal is that because we have so many, and because agriculture is such a prime mover of the economy of California, we don't want to lose agriculture, but we certainly want to help figure out how to make it more efficient and compliant and friendly to the environment.

That's not to say that we have intentionally tried to change the environment in a negative way. But we know a lot more now than we did 50 years ago.

Some of the biggest issues, as you well know, are the new regulations. And you've heard a lot about all of those previously, so I won't go into those. But water and air for production agriculture is the big issues.

A way that the dairy industry and the food processing industry has tried to address these issues is the increased use of anaerobic digestion power generation type operations and facilities. And these systems have been in California for 35 years. This is not new except that they haven't been overly successful in implementation.

As you can see here recently there was about 15 digesters that were operating in California. When the new rules came in and some new policy came into place, some went offline, we now have, we had some digesters that were being supported by the California Energy Commission through some financing to put those in through grants.

Some dairy representative and industry representative groups helped to move that money out of CEC, out into the industry. And they supported -- and this was about five years ago, they supported putting systems in.

All of the systems that have been installed on California dairies to date are lagoon-style systems. Either plug flow or complete flow and various different kinds.

And the result is that when the new regulations came into California these systems that historically existed couldn't meet the new regulations because it was an old technology, an old design. And it was an attempt to -- and in order to manage costs, used equipment that needed to be retrofitted in an effort to meet the new regulations.

So, because of that, and because of some very limiting regulatory situations we have right now, dairy digester systems are closing down, and a number of them have been stopped. And I want to get a little bit more into the systems that have been -- that the projects that have been stopped mid-stream and aren't going forward because of regulatory permitting issues. Primarily what the air resources in the central valley, but also with some of the water boards, as well. But not quite as bad as the air board.

In California the opportunity for renewable energy, well, this was USEPA's agStar program. These were the numbers of digesters around the country. And what is astonishing to me is if you look at Wisconsin they have 20, New York has 16, Pennsylvania has 16. California has 15. California has the largest number of dairy cows in the country per capita, per square mile. Why in the world are we behind in these numbers?

There's some really specific reasons why that's happening. There's been a number of regulatory changes, as well know, as we've heard. And I won't spend a lot of time on this. And that's the Clean Air Act has criteria pollutants, NOx, PM, CO, SOx. State regulations in the last few years have ended exemption for agriculture in meeting some of the standards that apply from the federal rules.

The criteria pollutants, somebody from Placer County Air Board, sorry, I don't remember who you are, he was talking about criteria pollutants. And that is not a term I've heard but once today. We've heard a lot about greenhouse gas emissions, greenhouse gas containment, greenhouse gas reduction.

Guys, that's not the problem. The reason these projects aren't going into place is because of the criteria pollutant issues, and the minimal flexibility and knowledge of some of the regulatory agencies about the criteria pollutants in comparison to the overall impact of greenhouse gas emissions. And there's no balancing act, there's no room. And that's why these projects aren't going in.

San Joaquin Valley, -- where most of the work I've done, is in the San Joaquin Valley with the San Joaquin Valley APCD. And basically the comments that we have gotten, both in writing and verbal, are that we don't care about greenhouse gas emissions, we don't regulate them, we don't care about them, we only care about criteria pollutants. That's the stance they're taking on putting projects in place in the San Joaquin

Valley.

The impact of the regulations is that if California's Central Valley, which is an extreme nonattainment area, we know that, we're not denying that, is that if we didn't meet these criteria pollutant standards they would lose millions and millions of dollars of the federal transportation dollars.

And that's very significant. That's not to be minimized by any stretch, because that's a really significant component to California. And if can't move from L.A. to Sacramento or San Francisco, it's a really big problem for the state.

So we agree. We're not disagreeing that we don't need to continue to work towards cleaning up the air in the San Joaquin Valley. But we do believe that there are ways to do this and to have what many of my dairymen have said, those toilet-ringed visions and you're eyes, you know, when you look at the core of the toilet paper and you're only looking at the world like this, that's not getting the world, and that's what's happening. That's why things aren't getting better.

But you what the really sad part is? Is

the air quality in the San Joaquin Valley has very much improved. But I bet you haven't heard much about that, have you? No, you have not. You've only heard about how bad we are, not the improvements that have been made.

So, with the new regulations it's creating some really interesting dynamics. And all the different boards, we have a Sacramento board, we have the South Coast board, we have the San Joaquin, I think there's about 39 air boards in the state or something like that.

The San Joaquin Valley APCD has taken it upon themselves to play the role, the lead role in this establishing standards and establishing how you deal with these standards. And unfortunate part is they're wrong. Sorry. There are some that have been successful; and there are some that haven't been successful.

And the problem with their lack of ability to look beyond this very very narrow individual scope is that projects are not being moved forward. The dairy industry is not being allowed to move forward with the municipal waste group and the forestry group, because there are individuals who have said, we don't care about greenhouse gas, we don't care if you produce energy, we don't care if you make a better solid waste product, if you make a better water quality, we don't care about any of that.

Se we care that you're creating a little bit of something we have no ability to manage. So, we don't care. And I can guarantee you that after three years of one project, it's extremely frustrating and it's terribly terribly expensive.

And you don't get progress. You we didn't stop with Henry Ford's Model T. We kept moving forward, right? And we've seen it in the forestry today. We've seen it in municipal waste. Why aren't we seeing it or being allowed to do it in production agriculture? That's one of the questions I truly am interested in getting an answer to. And I'm sure I've made a few people a little squirmy and uncomfortable or unhappy.

The problems with the dairy industry is that we got a really tight budget right now, as you well know. Milk prices haven't dropped, but what we get for the milk has dropped.

And so in production agriculture in California already on a razor's edge. And so when the economics change it makes anything extra impossible. And that is the reality.

So, the deal is doing these projects is an extra now. They can't be afforded. I've heard from a number of individuals interested in helping with the money of it, and I'm like, fabulous. I do grant writing. I'm fabulous when somebody wants to bring me money and I don't have to write a grant for it.

But, the problem is they've got these enormous budget, and the issues around the budget are we don't know what limits we're supposed to be meeting. We're being required to install unproven technology for its application.

And most currently, technology that is costing me $106,000 just to purchase a piece of equipment that no one, regulator or otherwise, can tell me it's going to work. So, anybody got an extra $106,000 I can have? Just asking. Somebody else thinks I do.

We have to deal constantly with an inaccurate economic data and analysis. We saw it earlier today. When you over-estimate the value of something, or you under-estimate the value of something, the economics go out the door. And what happens then -- oops, I'm hitting the wrong button, sorry about that -- so then what happens is setting up an economic structure is really challenging.

Because of the mandates of being forced to use technologies we don't know that work, because the legal costs associated with trying to determine a legal permit, which is a whole other conversation we won't get into because I really will get myself in trouble, and the fact that the uneducated regulatory people who have to decide on the ground whether they're going to issue these permits.

I've spent three years educating senior level engineers at APCD about what's the difference between a rich burn and lean burn IC engine. What's the difference between natural gas propane and biogas. These are senior level engineers deciding on permits, guys. It's a little bit frightening, okay.

I'm going to tell you about a project I worked on that is an unbelievable project. Yes, it's mine, so I'm going to tell you it's pretty impressive. But I'm going to give you a little bit of the facts on the deal.

Fiscalini Farms decided to do a

renewable energy project three years ago. I was asked to come onboard, help with grant writing, but also help with technology, project management, you know, regulating, permitting, all those other kinds of fun and exciting things.

So we initiated discussions with the air board first in January of 07. That permit was finally issued last December, 24 months later. It was a $35,000 bill to get that permit issued. Okay.

Primarily because the first permit that was issued had illegal standards on it. The emission standards we were being required to meet were technically and legally unattainable.

That's a really big issue. And we can get into it. I can spend five hours talking about it, so I'm not going to go there. But if you want more, I can tell you more later.

What was surprising to me was the water board was really not that bad. So kudos to Region V, San Joaquin Valley Water Board guys for issuing permits in a really reasonable time. We got them in like about six weeks of work, and that was fabulous, you know, I'm feeling pretty good about that.

But then we ended up with being required to put reports together that nobody knew what they meant. They gave me an acronym and nobody could define the acronym. Then I was going to get a notice of violation because I didn't do a permit that nobody could tell me what was supposed to be in it -- I mean didn't do a report that nobody could tell me what was supposed to be in it.

So, we're working that, and that's okay, that's a little technicality; we worked through that. So I have to say, you know, the water board was really quite nice to deal with.

The project, itself, is at Fiscalini Farms. They milk about 1500 milking cows three times a day. You can see -- the uniqueness about that this particular facility is that he milks three times a day. Not all dairies do that.

He's landlocked with 460 approximate acres of farmland that he farms to produce feed for his livestock. He instituted triple cropping ten years ago. That's something that's start to catch on now. But, it wasn't going on ten years ago. So he was a pretty progressive guy in his own right, him and his dad.

He has not added commercial petroleum-based fertilizers to his crop in over 15 years. The biology of his soil is unbelievable. He uses only the water in the storage lagoon, and the solids produced onsite. If it's not for bedding he uses it onsite, and he sells minimal to local farmers.

He also was a guy 15 years ago willing to work with UCD on groundwater, working with a couple of researchers on groundwater monitoring and data collection on quality and flow. There was three dairymen in the state of California willing to do that. This was one of them.

We decided on a technology that didn't include a lagoon. And that, to me, was a pretty big first step. We decided on a technology that's a variation of a German design that is two aboveground concrete tanks. And I'm showing a little bit about a process -- I'm showing you a quick view of the process we went through to construct this project.

Here we have the tanks, these red coils on the downside are the heating coils for the tanks. The tanks went in. In the center we have an upside-down wagon wheel that allows for the netting which you can't -- yeah, you can kind of sort of see it, at the very top there's a netting that goes over the top of this reversed wagon wheel. And it's so that we can hold the conical double-bladder flex lid on this tank out of the slurry that's in the tank.

The net, as a result of work that has been done in Europe, they discovered, serves a great home for the hydrogen sulfide. And then with a little bit of aerobic activity on the very top of this tank, we're breaking down the hydrogen sulfide into hydrogen and sulfur.

The sulfur forms these, what are the, the stalactites, is that the one that goes upside down. And then as they get heavy enough they drop back into the slurry and they're digested off.

Once the tank is all in place and we've got the top on, they have heating coils in this 14-inch wall, they have heating coils in them. We have insulation. And then because this particular dairyman loves blue, we have a blue exterior on them.

So ultimately this is what they look like. This is onsite, this is our project. The conical tops, we call them the circus tops. The dairyman wants to make them look like Holstein cows, so we'll see what happens there.

(Laughter.)

MS. DRAKE: A little interesting, but, you know, dairymen are a little interesting. What we do is these conical tops allow for up to a week of biogas storage without having to flare.

The gas that's coming out of the -- right now we're coming online next week, so we don't have all the heat cycling and all the product working right now. But one tank we have a boiler on it. We're heating one tank and we're not heating the other tank, and gathering data.

And what's intriguing as all get-out is out of a lagoon digester your H2S bubbles, hydrogen sulfide levels, which, in fact, are quality of the gas and your emissions and various different things, runs between 2 and 3000 ppm.

These tanks -- our nonheated tank is emitting gas for the last four months at 200 ppm. And our heated tank is at 100 ppm. That's where we're starting.

So, then the other thing we're doing is not only are we doing a dairy manure flush digestion, we are also including a sudan grass silage. As part of the nutrient management on this dairy his triple crop is sudan. It helps modify the nitrogen in the soil and the water we have to deal with.

But it's a crop that if it gets rained on he cannot feed it to his livestock. Therefore, we decided instead of throwing it out and letting it rot, we're going to try and see what it would do to the biogas production in this tank.

And because it's produced onsite I was able to get a permit from the water board that allowed the co-digesting.

This facility also has an on-farm or onsite artisan cheese plant. We are permitted, with the water board again, because it's produced onsite, to allow the whey to go in with the flush to the tanks. So we are co-digesting the manure, the whey cheese waste and the sudan silage. It tripled our gas production.

Therefore, we ended up with, instead of a 200 kW engine, we have a 710 kW engine we're going to be generating power off of. We're pretty much looking at some of the preliminary data we've got without it going online, just by the gas production alone, this might not be big enough. And we're pretty excited about that.

This is my favorite part. It's the biggest engine I've ever seen; and it's so cool, and it's not really that loud.

So we talk about the environment -- I'm sorry, I'm a mechanical kind of gal, so, you know, there you go. I just wanted to give you some of the statistics. I've worked with Alan DaSault with Sustainable Conservation quite a bit on this project. And I really wanted to make sure we really were doing the right thing. Because we certainly didn't see that from the regulatory agencies. We felt like we were building a shopping mall on a wetlands. But --

(Laughter.)

MS. DRAKE: But these are some of the statistics on this one project. One project. And remember in the beginning, I said there was 2300 dairies in the San Joaquin Valley.

When we get this project online, look at this, 5000 cars. We can power up to 600 homes. And we decreased the water use by 250,000 gallons a day. Somehow I'm kind of thinking this is a good thing, but perhaps I'm wrong. And if I am, please tell me. Or inform me of what's going on here.

We also have some recommendations to the regulators, and I know I have only a short period of time. But let's establish rules everybody will follow, okay. Let's establish standards that are achievable, not marketing material. And I can explain that later if you're interested.

Not -- well, gosh, I kind of believe -- gosh darn, we believe we can do it. No, guys. This is money. This is real money, real people, real jobs. And I'm here to tell you it's real work.

And that .15 grams per brake horsepower hour that we were told earlier, and it's not Bryan, don't blame Bryan, because I know where he got that information. Not really, guys. The real number is 50, not 9. That's illegal, and we can get into that later if you're interested.

We got to work with dairymen and technology vendors that are willing to try to continue to grow our model A to a sportscar, okay. This technology we installed here is next generation technology. This is not technology from the 70s and 80s that have historically been put in. This is next generation stuff.

It's not new. It's all over Europe,

Thailand, Ireland and every other world but California and the west coast. We'd like to see a lot more of them. We'd like the regulators to allow us to try and to continue to get better at it.

The last one is listen; I'm just asking regulators to take a pill and listen.

(Laughter.)

MS. DRAKE: We'd like acknowledgement that this technology has successfully been operated around the world. This is not rocket science; it is not new, okay. We didn't invent this last year.

We would like a willingness to allow us to generate data to prove. And if we've got to change something, we'll change something. But let me start the damn thing and let's figure out what's going on, okay.

And we would like the regulatory agencies to really look at the spirit of the law. And if the law, perhaps, is not written the best way, let's look at how we make it so it is the best for the public, for the environment, okay.

Not because there's words on a piece of paper that they think they're interpreting correctly.

Recently the state of Washington, I added this and I had to have them change my presentation because I added this, I just got this three days, what day is it, the 9th, I think May 9th this came out. Alan, is that right?

Anyways, Washington State just has allowed co-digest, signed a law, the governor signed a law that allows co-digestion in these anaerobic digesters. Co-digestion is the key. That's how you increase your biogas production, increase your power output. Either by biogas, by electricity, by heat, however you want it because that's where you make money.

The state of California, you're not allowed to co-digest if it's not built onsite, it's not made onsite. So you guys with restaurants, municipal waste -- where's that guy at? -- sorry, guys, we'd love to take it, trust me. We can't right now until somebody helps us change the rules that allow us to co-digest.

Oh, but by the way, we could. It's never been done obviously because we could, you know, ruin or damage water quality. Apparently Washington hasn't heard that news.

In conclusion, I know I'm being a bit

facetious only because you really don't want to see me get fired up over this issue. I've spent three --

(Laughter.)

MS. DRAKE: -- years on it. There's a few people in this room who have seen me go over the edge on this issue. So, I'm trying to keep it light.

Dairy producers that are willing to put these projects in are willing to step out in front. These guys are willing to risk some financial and some bad press to try. And the regulators are acting as they're out there to damage more than help, and that's never ever been the intent, and it doesn't continue to be the intent. So there's some real disconnect there.

Because of the regulations, dairymen are saying forget it, forget it. My guy, Mr. Fiscalini, didn't want to come today because he's just so disgusted with the regulators. He's disgusted with what the regulators stand up here and tell you they're really trying to do the public good, really the public good. And this doggone dairyman, he's just trying to make money on the deal.

Guarantee, I'll tell you right now, I run the budget. We are not making money on this deal. And we may not for the next ten years, okay, guys.

But it's too much headache, it's too much cost, it's too much expense, and it's not worth it to be given such -- made into such bad villains for something they're trying to do right.

So, the bottomline is we got lots of opportunity to make a lot of air quality improvement; to make a lot of renewable energy; to make a lot of renewable heat; to continue to build the economy in California with production agriculture.

But unless the rules are changed, it isn't going to happen. And I'm not saying we're perfect. I'm not saying there can't be improvements. But all I'm asking for is a chance. A chance to try, that's all I'm asking for. And that's what, to date, we have not really been given.

So, with that, there you go. Common sense. Thanks, guys.

(Applause.)

DR. KAFFKA: Normally, midafternoon is a

sleepy time.

(Laughter.)

DR. KAFFKA: Time for a few comments or any questions. Please give us your name.

MR. KULKARNI: Hi. My name is Pramod Kulkarni; I'm with the California Energy Commission. The question I have is the Fiscalini Farm, the technology, is that transferrable to 2300 farms? Because you got all the uniqueness of the Fiscalini Farm. You got the sudan grass, you got whey to co-digest, and you got some permits in place. How duplicatable is the particular technology, given that, you know, there's so many diversity in the kind of 2300 digesters have? I mean the 2300 dairy farms have.

And secondly, you have a cogeneration on the site.

MS. DRAKE: First question. Yes, it's very transferrable. The beautiful thing about this particular kind of technology, it's very modular. And so the tanks you saw there, 850,653 gallons apiece, they don't have to be that big, first of all, okay.

So we're going to really look at your operation. We're going to decide, based on your operation, what fits you best, okay.

Second thing we're going to do is we're going to look at where are you located. Do you need to do biogas to a pipeline? Do you want to do IC engines? You know, what is your needs, what are your resources.

The other thing, too, is I've really discovered through talking with other dairymen they have resources on their facilities they don't even realize they have. And so that's something we would really take a close look at.

So, yes, transferability, absolutely. I truly believe that will happen. We are using a CHP, the Guascor 710 kW engine. We are generating power, and we are using the heat onsite. We have a full demand on all the heat that we're generating.

And we have a power purchase agreement, interconnect agreement, with Merced Irrigation District. We are not in the PUC territory, so we had to create agreements with the local utility provider. And that we will be selling that power.

The beautiful thing is the power that we are selling is going to help offset the costs of this project.

MR. KULKARNI: Okay, had you not been in MID, had you been in some other utility's territory, would that have been as easy or not?

MS. DRAKE: You know, I can't answer that directly only because there's been a lot of ground cut by a lot of other projects. And so setting a new PPA is not quite as difficult as it was even five years ago.

So, technology still applies. And I think that we could probably do a pretty good PPA wherever we go. It's really dependent on the technology and the utility provider.

I must have stunned them, there's only one question. I got lucky.

(Laughter.)

MR. SHAFFER: I can't resist.

MS. DRAKE: Okay, Steve, what do you want?

MR. SHAFFER: Steve Shaffer, --

(Laughter.)

MR. SHAFFER: Well, also having worked at Food and Ag for 34 years, and helped put in the second digester in the state in 1983, a little bit of experience. So I appreciate hearing your voice of experience.

Just another little editorial. There are, I think, certain segments of the community which would just as soon see the dairy industry go bye-bye in the state of California. And therein lies, I think, part of the problem. Again, the need for public outreach.

MS. DRAKE: Yep.

MR. SHAFFER: A technical question. Does Fiscalini import any feed onsite to the dairy, or are they totally feed self sufficient?

MS. DRAKE: No, we import the microfeeds.

MR. SHAFFER: Okay. But, no --

MS. DRAKE: You know, that --

MR. SHAFFER: But no --

MS. DRAKE: But we have a little bit of alfalfa that we --

MR. SHAFFER: -- corn or --

MS. DRAKE: -- no, --

MR. SHAFFER: Okay, all right.

MS. DRAKE: No corn.

MR. SHAFFER: So you are in a reasonable bounds in terms of salt?

MS. DRAKE: Oh, yeah. We're actually in really good shape.

MR. SHAFFER: Which was one of the keys with the central valley, not wastewater board, but --

MS. DRAKE: The water board, right. Right. Yeah, no, this particular --

MR. SHAFFER: Yeah, Regional Water Quality Control Board.

MS. DRAKE: -- operation, and I think it has a lot to do with the fact that there's not external fertilizers brought on the place.

MR. SHAFFER: And then the other key was aboveground tankage rather --

MS. DRAKE: Yes.

MR. SHAFFER: -- than a lagoon.

MS. DRAKE: Yes, that helped tremendously keeping us up out of the ground for potential leakage. We have four feet of concrete due to seismic activity, and 14-inch walls. And when they asked me about potential groundwater impact I thought they were talking about irrigation water. And so I was like, umh, you know, and she goes, no, no, no, no, not irrigation. From the tanks.

And I looked at her and I said, umh, none, you know. And then they wanted us to pay to insure that it wouldn't leak. So we were going to have to pay to have it sealed. And then we looked at the, you know, the common sense of sealing this tank, given the product that was going in it. And we got past that conversation.

(Laughter.)

MS. DRAKE: Thank you. Thank you.

(Applause.)

DR. KAFFKA: Okay, folks. I suggest we reconvene here at 3:30. We have three very interesting presentations at the end of the afternoon, and then time for discussion.

So, 3:30.

(Brief recess.)

DR. KAFFKA: I'm kind of a tyrant when it comes to staying on time. And I always think we have these people who have worked very hard to make these wonderful presentations for us. And so I would like to move right along. I'm sure the rest of the audience will wander in.

The first speaker in the last session of the afternoon is Fred Skillman, Jr., from -- he's the Supervising Project Manager for Pacific Gas and Electric Company. And he manages the CPUC and FERC -- oh, FERC, that's interesting --

jurisdictional generation interconnections. Have to ask you about Klamath River some time.

Mr. Skillman's been working in the utility, in the communication industry for more than 25 years, including time managing installation of a 5 megawatt windfarm above the San Luis Reservoir. Wow.

Mr. Skillman has extensive experience in project management and international product development. He's the PG&E lead on the CPUC's rule 21 working group, which works with customers, generation developers, regulators and other utilities, developing policy and technical improvements in the interconnection process.

He's a graduate of CalPoly and also the University of San Francisco. Mr. Skillman.

MR. SKILLMAN: Thank you. Good afternoon. And thank you very much, Steve, for the kind introduction. It's a pleasure for me to be here again. My name is Fred Skillman. I work with Pacific Gas and Electric Company in generation interconnection services.

Our role is to serve as a single point of contact for any customer, whether that customer is a third party or a utility generator. Any customer that is paralleling or intends to parallel a generator to the utility grid.

PG&E has clearly been in front of this issue and is positioning ourselves for the future. It really is illustrated in this pyramid, which is our vision and goals pyramid at PG&E, where over the last year we included the environmental leadership as a strategic goal in terms of our ability to position ourselves for the future in terms of being recognized as the leading utility in the United States.

Our focus here today, and the entire day, for me, has really been very intriguing. I've enjoyed all the speakers, and enjoyed the discussions, and very much the balance. As a utility representative, working in the renewables area, it's nice to see that balance and to see the shift.

But clearly, the issue is one that, in every area, there's clear opportunities to be addressed.

Certainly California, as an environmental leader, California, itself, is something, is an entity of itself. It was interesting for me back during the deregulation experiment in my travels throughout the country, to hear those folks that would look to California. At that time it was their opportunity for the friendly jab, if you will.

But on the environmental side it's much different. California is clearly getting the recognition in terms of leading the country, and hopefully the world, in the right direction.

Certainly in terms of what makes that possible for PG&E is certainly our issues where we have now decoupled our revenues in terms of with rates. We no longer have our incentive to just sell commodity. And that really, along with the loading order that we have, is something that when we look at this, and I appreciate Dr. Nechodom's statement in terms of when you think of sustainability, it is something that is more broad, and something that is forever.

Clearly in terms of renewables, success, like any opportunity, is one that there's been good preparation, the technology is there, the timing is there, and it all fits within the policies that are there, as well.

For success in renewables, we're really looking at, you know, a multi-faceted stool, if you will, in that clearly energy efficiency is hugely important on this issue. Demand response, renewables, distributed generation, these are all very important steps as we go forward. But I'd even add incentive structures, you know, the market innovations.

And personally having followed this industry for many years, I continue to be disappointed with the amount of effort that's, in terms of resources, put towards research and development. That clearly needs to be bolstered, as well, because when we're talking about electricity, as you all know, oftentimes it's very easy to try and analogize how we can make this industry work, and analogize it to other industries, other commodities that have the ability to store that commodity.

California, again, has been very bold in terms of our renewable portfolio standard. It's been something that's been mentioned several times today. Clearly it's been discussed in terms of the mandates for the 20 percent by 2020.

And many of you may know that the PUC, in their meetings last week, supported SB-805, that would change that mandate to 33 percent by the year 2020. So, you know, the writing's on the wall clearly. And it's, you know, how are we going to take advantage of these opportunities.

In terms of PG&E, again, a lot of the focus -- and it was mentioned, reiterated, you know, the issue in terms of climate change. Carbon is huge. It's very interesting that the focus has been so prominently on carbon. And clearly, PG&E, over 31 percent of the generation portfolio that we have is carbon neutral.

And so, clearly, in that regard it's a positive. And with regards to the various renewables, themselves, you know, PG&E has contracted over 1000 megawatts of renewable energy here just within the last couple years.

These types of things really are to point out that PG&E is very responsive, as I know the other investor-owned utilities in California are, as well. But are very responsive to these renewable projects.

This graph just simply illustrates the whole issue, again, in terms of, again, pointing to California. And I really take from this graph here, really the awareness that has taken place really over the last, if you will, 30 years in

California.

The green line here shows how our per capita demand on energy has been relatively flat. And, you know, we can go back to the days of PURPA in the 70s, and the whole issue around energy conservation and the awareness there.

And, you know, Californians, you know, this is an issue that California's -- it's not new to Californians. And my point is really that there's been a lot of progress made to date. But that clearly there's more opportunities looking forward.

PG&E has contracted with many of the traditional renewables, the biomass, small hydro, the geothermal and wind systems. And we're also contracting with new renewable biogas ventures, as well.

We've injected into our pipeline gas into our San Joaquin Valley area. We've been purchasing biogas out of Texas. These resources are being used as product to run our recently commercialized Gateway generating facility.

And when we look forward, you know, emerging technologies, biogas, concentrated solar, wave power, we recently received approval from the

PUC to go forward with a demonstration project that will look at the viability of wave technology. So that's, again, a very exciting opportunity.

This graph here is really just to point out the aggressiveness that we've taken in terms of our renewable contracts. The orange part of the bar really is focusing on solar. And like many of us know, clearly, you know, solar is getting their day in the sun in a lot of different areas.

And it's a good thing. It's good in that it adds to that diverse portfolio. As a utility, as a utility and certainly as a Californian, you know, we in the west coast here would probably see a lot of folks going postal if our consumers had to live through the experiences that some of our fellow Americans live in the northeast.

You know, the demands are very high. Our energy resource is all based on being able to serve peak load. That one hour out of the year that all of us want when we go home and flip on that light switch, we want to start cooking dinner. We don't want to see those blinking lights.

I point that out only that as were talked a little bit earlier, you know, there are a lot of social issues that are going to be addressed as renewables move forward.

And us, as individuals, our needs or expectations in terms where our energy is coming from, the message has been clear that folks want green energy; they want renewable energy. And that's a good thing.

But somewhere in the dialogue we're going to have to make some choices in terms of how we want to go forward. And a lot of that, I think, will be based on information.

I oftentimes, and many of us at PG&E who are in the service business, like to take the perspective of our customer. Clearly, as you all know, we have self-generation customers that come to PG&E with an interest in interconnecting their generation.

We also have ratepayers. And so clearly what goes along with this is the balancing between our two primary customers.

But I think it's very appropriate when we think about renewable generation, to think of it from the customer's perspective. And I'll apologize to all the men in the room, and support all the women in the room that think that men try to over-simplify things, because I'm going to just do that right now.

In that when this community, when this industry looks at renewables, fundamentally they're looking at something that's clean, looking at something that's good for the environment. Looking for the utilities to interconnect their generation with a minimal of requirements.

And fundamentally our customers believe that they're doing a good thing. And that as our culture here in the U.S. and throughout the world is, again, raising its level of awareness in terms of the environmental issues.

Here's a solution that our customers have, so to speak, in their back pocket. And they just simply want to implement it. And so it's very important, I think, that as we're looking at this, and we're looking how we move this whole agenda forward, it's looking at things from the perspective of those that are implementing; the customers that are stepping up, taking risks, and implementing these types of solutions.

And, you know, for us here that have been focused today on either the drivers or the barriers, if you will, specific to biomass, it's all over the board. Again, from a customer's perspective, many of them come to the utility looking for information. How do I get my generator interconnected.

And our role in generation interconnection services is really to try and implement their needs, implement their interest in terms of connecting that generator. And doing it within all the constructs of federal and state law, utility policy.

And so what this slide really is intended to point out, that from a customer perspective there are barriers throughout every level or layer of getting their generator interconnected.

Issues in terms of particular codes that are crafted by our legislature, that again, with all good intention on their part, is focusing on a specific need, a specific gap. And they try and fill it with legislation.

But oftentimes in that good intention

conflict arises. Either conflict between codes and other layers, in terms of the regulatory and the utility, as well.

We do have a recent power purchase agreement that is for a feed-in tariff. I know there was discussion earlier, and Ms. Brown also talked about a feed-in tariff up to 20 megs.

There does exist a feed-in tariff. It was adopted last year. It's new; it's capped at 1.5 megawatts of generating capacity. And that technology would be eligible under Public Utility Code 399.

NEM-Bio is the regulatory tariff. The legislature, when they created that for each generating facility, it's up to a megawatt. But the legislature also authorized three larger plants.

One thing to point out in terms of this net energy metering tariff, is that it expires at the end of this year. So I think hopefully there'll be a statute to extend.

Departing load. Again, and for all of you, all of these slides will be available through CBC's website here next week, I understand.

Departing load. Clearly the issues of

fees in terms of barriers. Again, things that equate to cost, fees, requirements have the flavor of being a barrier, because they obviously increase the transaction costs.

Departing load. Depending upon whether or not a technology can meet the BACT standard or not, this renewable technology still may be required to pay departing load charges.

The market, itself. Again, solar's getting its day in the sun. There's barriers in terms of equity barriers, if you will, in terms of how some technologies, some renewable technologies, receive incentives or rate treatment that's say more favorable.

So clearly that's an issue that -- and part of the point here is that our policymakers are very much focused on solar and supporting the California Solar Initiative.

PG&E has a lot of information on our website. It's under the "generate your own power" page. That's our home page. There provides all information to any either CPUC, state or FERC jurisdictional interconnection.

So I encourage you, if you have any issues, to look there. And clearly, you can always call, as well.

Thank you.

(Applause.)

DR. KAFFKA: Comments or questions?

Okay, then we'll move right along. Thank you very much.

MR. SKILLMAN: Thank you.

DR. KAFFKA: Our next speaker is a Board Member of the California Biomass Collaborative. Better put my glasses on, actually, so I can read this. I can't bear to wear glasses all the time, so.

Necy Sumait is a Director and Executive Vice President for Bluefireethanol, which I think is a great name for a company. She's been involved in the commercialization of Arkenol's concentrated acid hydrolysis process that converts cellulosic waste materials to ethanol, including the successful committing of Arkenol and Bluefire's projects in California.

She's also been active in participating in national and state efforts to advance commercialization of biomass renewable fuel technologies.

Prior to Arkenol, she was Vice President of LUZ Development and Finance Corporation, where she successfully permitted nine solar thermal projects totaling 500 megawatts through the CEC, California Energy Commission.

She has a BS in biology from DePaul and an MBA in technological management from Illinois Institute of Technology. And she is, I mentioned, she's also a valued member of our board of directors.

So, thank you, Necy, for --

MS. SUMAIT: Thank you. And thank you, all, for staying. I know it's hard in the afternoon to say. And hopefully it'll be worth your while to stay the few minutes.

As Steve said, I am from Bluefireethanol. And I'm hoping to p[resent a case that brings the concepts that Coby had spoke about earlier into reality in a project that we can all wrap our hands around and see how it could be possible to do something like this in California.

I also talk about the challenges that we've encountered over the years in trying to get this technology off the ground here in the state.

Just a little background about Bluefire, just so you know what perspective I come from. What Bluefire does is we convert cellulose that's in waste materials, ag, forest residue, green waste, et cetera, into sugars that are then fermented for the production of fuels and chemicals, such as ethanol.

Ethanol is just one of the products that can be produced once you get the sugars unlocked out of the cellulosic material.

We do this through a process called concentrated acid hydrolysis. It's a biochemical process, not a thermal process. We piloted the facility for over five years in a pilot plant in the city of Orange under Arkenol, predecessor company of Bluefire.

We also, under a limited license, provided it to a Japanese company that demonstrated the technology for another five years in Izumi, Japan.

The background of the people in Bluefire were project developers, come from the energy industry. We were really looking for thermal hosts to put our power plants in to make them more energy efficient, more competitive. So instead of putting a power plant where a thermal host exists, we thought we'd put the power plant where -- and then put a new thermal host, using a different technology.

And so we've been at this for awhile, you know, as ArkEnergy and then as Arkenol. So, we haven't made any money on this technology, so we're either insane or really think that this is a good thing. And I think it's the latter.

You know, what we have is really -- we think that it's well worth the effort we've put into it over a couple of decades now. And we hope that very soon we can bring this to fruition.

So we tend to look at projects where you can optimize your competitive advantage. Because it is a biochemical process, you can put it where there's a good volume of material, cellulosic in nature. And chances are those are close to the markets for the product.

In the case of urban waste, where you have urban waste you probably have a transportation fuel market. So we're able to bring the production facility closer to the markets.

And we also, I think now, compared to a decade ago, in an environment where there is an increased awareness for the possibility and the opportunities that conversion technologies, biofuel, renewable energy can provide.

And, you know, fortunately, we do have a shovel-ready facility. You'd think everybody would be clamoring to try and get us going. But it's still challenging, but hopefully it will happen fairly soon here.

The process, itself, is quite simple. We take biomass; we use sulfuric acid to break apart the cellulose into the sugar molecules. Cellulose is just a bunch of glucose put together.

So we take it apart with concentrated acid hydrolysis. The residue, the lignin, that is basically the glue that holds the sugar molecules together is used in a boiler to create the thermal needs for the plant. So we're energy self-sufficient.

And the acid and the sugar solution goes to an acid-sugar separator. We reuse the acid. The improvement that we've made to the technology. Concentrated acid hydrolysis has been used since the early 1900s. So, if you've asked, you know, when was the first plant built. During war times they were using concentrated acid hydrolysis.

The problem was it wasn't economical because they weren't recycling the acid. And so we -- part of the improvement is to recycle the acid in the makeup. Right now it's like 3 percent, 3 to 5 percent of our acid use is makeup. And also the yields back then were not of economic significance.

So the acid and the sugar solution is just separated. The acid is recycled and reused in the process. And then the sugar is converted to ethanol just like in traditional ethanol processes.

We're doing a few projects, and the one that is shovel-ready is one in Lancaster. It's about 3.9 million gallons per year. I'll talk a little bit more about this project. But it's in northern Los Angeles County. We've got all our use permits and air permit, and so that is shovel-ready.

We're also one of the four remaining still-standing-tall DOE recipients in another project, 17 million gallon per year project that we're starting to draw funds on from the Department of Energy. And that is under their Energy Policy Act 2005 commercial biorefinery demonstration program. So we are one of the four, so California has a project in that program.

And we're hoping that, you know, the cookie-cutter plants are the bigger ones, the 55 million gallons per year.

I want to talk a little bit more about Lancaster. This is the one, you know, I think it presents a case for how we can use urban waste-to-ethanol.

This project, like I said, is in northern Los Angeles County. It is situated on vacant land, which we've since purchased, adjacent to an existing landfill. So it allows us to use the existing infrastructure to be able to reduce the potential environmental impacts.

The land use and the zoning in the area and of the site are consistent with the proposed use. It's a relatively undeveloped area.

We would be converting 200 tons per day of urban waste, green waste. This would be what we now call as alternate daily cover. This is the yard clippings, green waste, right-of-way trimmings, et cetera, that ends up in landfills as alternate daily cover.

We are using reclaimed water. We will,

like I said, produce about 3.9 million denatured ethanol to serve California's roughly 1 billion gallon per year ethanol market.

This project also was designated as a minor source from an air quality perspective. And despite all of that, it took us -- well, this one says two years, and it's still going. So this one's a little bit -- it actually took almost three years.

We, as a -- and I think I heard it earlier, applicants are wanting to be responsible. We know what the regulations and we know what needs to be done. And I think applicants come in with as best a project as they can have. And unfortunately, the process just sticks. There's a lot of uncertainty in the length of time, you know, time and money. Which, you know, small companies don't have a lot of.

So, some of the challenges. Like I said, after nearly three years of development and permitting, down to the last minute with one letter, we almost lost it all. We had to have a de novo meeting at the county to basically redo it, and we looked at our land use approval.

You know, at the end, they -- we got it.

But it was just disheartening to see that after all that time, after the numerous studies, our process allows for an 11th hour impact this way.

And as many of you know, we now need to pay attention to the challenges that our product market, with greenhouse gas. It's not a criteria pollutant that we were already concerned about, the criteria pollutant from the siting and permitting. There's also the greenhouse gas that's fairly taken center stage in terms of how biofuels will be deployed in the marketplace.

So I think we just need to cautiously approach that so it doesn't become a hurdle. The intent there, I think, is great. It's encouraging, low carbon fuel standard. But we just need, you know, regulators need to just be aware of not lose the intent, and not lose the fact that, you know, we're trying to encourage development in California.

And, of course, the renewable fuel standard at EPA is currently undertaking also has greenhouse gas as a centerpiece.

You know, the other thing, CEQA doesn't allow this. CEQA looks for what could possibly go wrong. CEQA never entertains the benefits of a project. So I think someone mentioned earlier, you know, we don't care about your greenhouse gas emission benefits and all of that.

And, you know, I don't know how you put that in. All the environmental benefits of biomass, which there are plenty of, that's not really what, you know, CEQA is meant to look at what could possibly go wrong. Not what that project could bring about. So, I think, you know, that is one thing that we need to focus on, as well.

Cellulosic MSW, it's really a -- has a potential role in sustainable biofuel production. We don't have to make feedstock; it's going to be here with or without us. The volumes are sustainable.

We can, like I said, use existing resources. And we can optimize existing infrastructure. It's already being collected. Part of the difficulties with using ag, which we, as a company, also tried that. And actually permitted a rice straw-to-ethanol plant.

But the issue with ag is then you don't have the infrastructure to collect, store, something that's very seasonal. The same is true with forests. There's a lot of forest residues that could be collected for an incremental cost that's not really that significant, because you're going in anyway to get some of the material. There's no infrastructure.

And so that's really what caused us to migrate towards urban material. Because it's already being collected. There's a possibility of contracting with the municipality. And the infrastructure exists. So urban waste presents a unique opportunity. And California presents a unique opportunity. They don't segregate waste in most states.

So we need to capture that ability that we have here in the state to actually, you know, encourage more of these projects to go forward.

And, I don't know, there's no pathway yet for MSW-to-ethanol in ARB's, but you know, I hope they consider that by diverting green waste from decomposition that there is that indirect benefit. Methane is 20 times more potent than CO2. The waste that's left to decompose instead of converting it to ethanol, there is that greenhouse gas reduction, which, you know, hopefully will be included in the benefits.

Coby talked about extending the landfill space. It's becoming very difficult. Our waste isn't decreasing. The ability to site new facilities and expand new landfill is just becoming very difficult here in California. So we need to find a different way to manage our waste.

And there's so much energy left in that material. We shouldn't bury it. From biofuels to biopower, it presents an opportunity with current resources to produce domestic fuels.

This information might be a little bit dated, but just to kind of give you a sense for how much could be out there in terms of biofuel potential, these are 2005 numbers. But just the green waste, alone, if you assume 3 million, and I'm conservatively using 70 gallons per ton, that's 210 million gallons of potential ethanol.

If you take half of the 42 million of MSW, that could be 1.2 billion gallons per year of ethanol. You can add agricultural residues. And then assuming just have of that is usable, that's another 700 million gallons per year. Forest materials, as well, provides an ability to produce ethanol. That's 910 million.

Before we even touch dedicated crops,

before we even go to energy crops, there's already material that's out there. So we don't even have to get into land use issues. There's plenty of stuff that's just there.

And the challenge is try to make those materials more marketable for technology. I think when we're asked, and when I'm asked, you know, what could we do to help you out. And I think it's in other states I've said is make your material more marketable and more attractive to technology providers.

So the opportunities for MSW use is there. Infrastructure exists. Urban markets allow for the market, for the production facility to be close to market. And this can fulfill the need for alternative disposal options.

Challenges. It requires an investment in conversion technology. There isn't one yet. You know, we built the pilot facility. We have Lancaster ready to go. The air permit's in February. And so I'm hoping that that shovel-ready plant will actually get going to bring California the first cellulosic ethanol plant.

We talked about educating the masses. I think we also need to educate the municipalities.

Their charter is not as long term. They're used to, they can look at budgets that put material into the whole. But they need to look at the longer term in terms of actually getting into conversion technologies.

Sorting of the materials. For our case, because we only use the cellulose, so there needs to be a sorting process there which our MRFs are wonderful. After the municipal recycling facilities get done with what they need to do, they still put into landfills valuable cellulose. So we could take that residual.

The need for the local government to address solid waste in terms of real costs. You know, the social and the economic and the environmental benefits, again.

So, you know, I encourage us to just kind of think outside the whole, and basically encourage the diversion of organics from landfills. I think the board's trying to do that.

AB-939 birthed MRFs, and MRFs, the municipal recycling facilities, have become an industry that's been pretty successful in California. And we can dovetail it to that current process by using the residuals. We're not competing with -- you know, they can take the recyclables and the higher value.

Need to encourage diversion of organics to conversion technology. On our lifecycle thinking we need to not only look at the potential problems, but look at the benefits, as well.

And I know there's talk about sustainability standards under CEQA. You know, there's plenty already hurdles for CEQA. When we start putting in additional sustainability standards that we have yet to meet, I encourage, you know, the regulators to take a look at what inflexibility you're adding to the process that further discourages the deployment of these technologies. It shouldn't impose additional costs and hurdles that -- it's hard enough to get these projects going.

You know, we need regulators to embrace it. We need them to, you know, the policies, the directives, all these goals are worthy. But we need to put them in place by implementing regulations that encourage, not discourage.

And if we do all of that, and, you know, we get what we're looking for, which is our decreasing crude oil imports, the greenhouse gas emission benefits, green jobs, and then, you know, basically from the urban perspective, an alternative way to dispose of our solid waste.

That's all I have.

(Applause.)

DR. KAFFKA: Any comments, questions?

MR. CASADO: My name is Chris Casado. I had a quick question. Can you talk about the break-even price, the range that you guys anticipate you need for your Lancaster facility?

And then -- I wondered, you know, if you could talk about the financing environment, and how the government grant affected your ability to raise private capital, and how you see that progressing in the future.

MS. SUMAIT: Let me differentiate the two projects. We have the Lancaster project, and then the DOE project. The Lancaster project, we thought we'd be up in the ground and running by now. All the money that Bluefire has ever raised as a public company went into Lancaster. Lancaster is a Bluefire, solely Bluefire funded.

So no public money has gone into that project.

That project is meant to deploy the

technology and just cover its costs. So, you know, that's not a rocket pro forma. So that is like a small-scale demonstration technology that -- I mean size that is of a commercial scale that is deployable. So that's going to be more expensive than we need to have.

The current market right now with the cellulosic producers' credit should help that project, so that we would be fine in terms of a break-even. But Lancaster's not one that's a commercial plant that has, you know, economics that make sense.

But what we're trying to do is do for contracting, because we do have to finance, is try to get a floor and a cap from a refiner. We're working with a company that would do that, just you know, it's basically you give a little on the first plant, and you lose it on the second plant, is how we're approaching Lancaster.

And then in terms of government funding, the DOE has provided the money for the second plant. The second plant is trailing Lancaster. So we're still in the development phase for that project.

Permits are not yet in place so you

don't really have enough on the books to go out and source financing. But the private capital is near nonexistent. Even with the loan guarantees that are out there, it is difficult to get a private lender to be in front of a loan guarantee application. Even the ones that are in ag that have done it before, and the bigger banks.

And so it's very difficult. And so that is why, I think, you look at what's going on in Washington. It's going to have the transition from a loan guarantee to something more like a direct lending type environment. Because the loan guarantee does not really help too much on the emerging technology because you still need a bank to do that. It helps, but in itself it's not, I don't know exactly.

(Applause.)

DR. KAFFKA: Okay, do you have slides, Russ, or are you going to use --

Our last speaker of the afternoon is Russ Lester. Before I introduce Russ, I want to mention that we're going to ask all of our speakers who are still hanging out here, after Russ is done come and sit up in front to see if there's any further discussion or questions that we have for them, in general. And also among each other.

Russ is the co-owner of Dixon Ridge Farms. And actually quite a rare person, it sounds like. A fourth generation California farmer.

Dixon Ridge Farms is in the Winters area. It's a vertically integrated organic walnut farming business and processing operation. He's the largest handler of organic walnuts in the United States.

They began farming organically in 1989, so that's quite a few years ago. And Russ has participated actively in helping to shape the standards for organic farming practices and certification.

He's also on the board of directors of the Solano Land Trust and the American Farmland Trust. He's been featured prominently in many public meetings on organic farming and agriculture in the west and elsewhere. He's importantly a graduate of UC Davis. Glad to hear that.

In 2007 Russ says he set a goal of becoming energy self sufficient by 2012. And part of that goal is to achieve this while being carbon neutral or negative, while maintaining steady production growth. There's other objectives that he might mention as he goes through the talk.

Russ, thank you.

MR. LESTER: Thank you, Steve. As Steve pointed out when I came here this morning, is that part of the curriculum when I was in college didn't teach me how to do PowerPoints. So, I've had to learn that over the years.

A couple of -- you know, I did want to mention the handout here. Basically this PowerPoint is on that, as well as a lot of background information so that, you know, hopefully you can listen and not have to take a lot of notes. That was my intention, not to waste paper. If you don't want it, please return it and we'll just continue to use to the next group.

There's a couple of things I wanted to say in reaction to, or not reaction, but in response to some of the comments today. And one, I have the dubious distinction of being an actual production agricultural person. The only one here, I think, probably. Nettie comes the closest to the ranchers. And so I'm the token farmer.

And I have the dubious distinction to

try to head you off before we go into the ethanol room later on.

(Laughter.)

MR. LESTER: And I'm not sure if that's the best place to be, because I might get run over. But I'll try to make it fast.

Ag is directly affected by the environment. We live in it on a daily basis. Our livelihood, our economic stability depends on it. And a lot of us have seen for many years that, you know, we believe the environment is changing here in California, and we see it regularly.

Things that affects us personally is the fact that if we have some 112-degree days in succession, with walnuts, we have lost up to 45 percent of our crop in one week. Okay.

Now, you got to remember, most agriculture is living on less than a 5 percent margin of economic viability. So 45 percent loss is something that you carry forward, if you make it, for a number of years.

So, just the real quickie thing about, another thing about biomass. We used to sell our biomass, our walnut shells, to a biomass plant. And, you know, the interesting thing that happened about biomass about the late 1990s, was that it went from being paid a fairly good quantity of money to deliver to a biomass plant, to those who are chipping prunings had to pay the biomass plant to take them, in addition to pay the chipping and the transportation.

So the reason why biomass isn't readily available is because of pure economic decision. What farmer would pay to have it hauled out of his orchard when he can recycle the nutrients, pay to have it hauled, and then pay to have it burned. Doesn't make a lot of sense. So that's why it died. Okay. We're trying to resurrect that and change that attitude.

Okay, Steve said that we're the largest handler of organic walnuts. Sounds impressive. It's actually only about three-quarters of a percent of all the walnuts that are grown in California and the United States. But we do handle that much. That's quite a lot.

It's about 3000 acres all together. We're vertically integrated. We raise about 500 acres, ourselves. And then we work with about 67, 70 growers, depends on the year, throughout the state of California to grow a lot of that.

We have been farming in California since 1867. This is probably one of the most important aspects. We have been sustainable for a long time, or we've been trying to go down the road towards sustainability, I should say.

And the way we do that is my definition now is that horizon of 1000 years. I like the attribute of saying forever, because I think that's actually where we should be aiming. But what's really important, in my opinion, to achieve that is that we use a whole systems approach to get to that point. We can't just look at one aspect.

And the thing that I was deficient in in Davis was that I was a scientist, and we were taught to look very narrowly at solutions, or problems and solutions. And what we need to do is expand that to look more globally.

So, mention our goal. I was probably sitting on a beach someplace drunk, but -- no -- having, you know, a little cocktail, but I decided, I was reading all these books and it was always way out there. You know, 2025, you know, 25 percent 2025; 2040, whatever.

And I decided that that wasn't

acceptable. That I thought we could do better. We'd achieve these goals a lot sooner than we think we can.

And so over the time, not only have I had that goal, as Steve mentioned, but to add these others ones, too. And probably one of the bigger ones is that it's transferrable and that it's cost effective.

We've always conserved. Our hulls, our shells go back into the orchard. As far as we're concerned, that's nutrition. It goes back into the soil. Why pay for more nutrition if I don't have to. The typical practices have been burning. And then you end up with a toxic pile of ash. Why not put those nutrients back in the soil.

So as you see, those things we've done, pruning since '76, chipping them, putting back into the soil. Mowing, you know, no-till, low-till. It saves a lot of fuel. We've been doing these things for a long time.

Most recent thing we've been working on is our irrigation. And we've been not only using VFD, variable frequency drive electric motors. We're putting one in this year, a 200 horsepower irrigation well. It's a very large VFD. Wasn't possible a few years ago.

It looks like that's going to save perhaps 20 percent of the electricity cost for that irrigation system. That doesn't sound like a lot, but on a 200 horsepower motor, it is. You're talking about a lot of electricity.

We've been doing smaller motors for awhile and love them. The only issue with them is some of the technology is still catching up, but it's getting much much better.

The irrigation system we're currently using operates, I said 20 to 25, actually it goes as low as 8 psi. And when we talk about pressure for irrigation system delivery, we're talking dollars. We're talking electricity.

We pump mostly groundwater. We pump, use as much electricity to get it out of the ground as we do to pressurize it. So every pound that we can cut is dollars saved and electricity saved.

Dryers improvement. We started out with simple circulation tent, just to prove the concept. And it worked. Now we put a building over the top. And what that basically does is recirculate warm air that can be recirculating during the drying process.

Solar. We've done this since 2004. We had probably one -- the company said it was the first PPA. I'm not sure if that's true. Where we didn't pay for the installation of the solar, but we provided the roof.

My opinion is roofs are ideal for solar. We have about 65 - 75,000 square feet of roofs, our processing facility. And my goal is to have every square foot of those roofs covered with solar. And that'll produce a lot of electricity.

We currently only have 3500 square feet. And the main reason is because I'm spending a lot of time doing regulatory things, which we'll get into a little bit later.

It's an ideal linkage to freezers, by the way. Because freezer usage goes up, electricity usage goes up during the day when the solar is out. Plus the solar panels actually shade the roof and keep it cooler inside.

The most current thing we've done, or one of the most current things we've done is we've worked with a company called Community Power Corporation out of Littleton, Colorado, who had a grant from the California Energy Commission to put a Biomax 50, it was actually they cut their teeth on forestry residue. There's a number of them throughout the United States and the world.

At the time that we brought it onsite it was one of four in the world, two that were actually operational. And the only one in California. And the only one using agricultural residue or byproduct, not waste.

We actually got the permit changed, or I'm sorry, the host site changed from this lumber installation to us. And we got it up and operational in about a month, month and a half.

Pretty nice deal; it's a modular. It sits down on the ground. And we just have to hook up a few utilities, although that does cost a little bit of money. And I'll talk about interconnection in a little bit.

It produces about $30- to $45,000 of electricity a year. Offsets about $12- to $14,000 worth of propane during drying season. What it does is it's a pyrolysis process that produces producer gas that can either be used for generation of electricity or, in our case, propane offset in our dryer to dry our walnuts.

The waste heat, or the byproduct heat,

can actually be used for the same thing. And we're looking at processes where we can use that even more fully by using absorption chillers.

As I said, hot water is hydronic. We will produce 100 percent of the fuel onsite. It's a byproduct of our processing. It's 100 percent local. There's no transportation costs involved with it, and the disposal of the char ash, which we have, will also be within our farm. So the local connection is very very tight little cycles.

About 820,000 pounds of walnut shell a year. We currently produce about 2.5 million. So we have room to grow.

The environmental impacts are obviously very small. Walnut shells are renewable. And what we're working on now is this carbon sequestration aspect. It produces a bio char. If you've read anything about bio char, it is very stable carbonwise. Looks like a thousand year half life in the soil. So, in other words, we're sequestering carbon for a long long time.

About 1 percent of all the carbon that goes into the machine comes out as char ash. The rest goes up as CO2 into the atmosphere. But that 1 percent makes it negative. And that's an important point. If a lot of people, if 10,000 people were doing this, there'd be a lot of carbon pulled out of the atmosphere.

We are currently producing about 80,000 pounds of char ash a year. And that's about half carbon, elemental carbon.

We currently -- what's our status report? We currently are generating about 20 percent of our current onsite electrical use. We offset about 40 percent of our propane use. We reduce our heater needs by about 70 percent due to the combined heat and power aspect of it all.

So therefore, all together, we're at 25 percent energy reduction. So in other words, we've already achieved what everybody's trying to achieve. If we have our ability, we can be 100 percent within a year and a half. We have the ability to do that. Actually, beyond 100 percent.

The cost is actually very very reasonable. Basically it's at the same price or less than retail price in propane and electricity.

Future projects. As I said, more solar on the roofs. We think that works hand-in-glove with our -- because we're organic we use a lot of freezers, because that's how we offset using methyl bromide and fumigants. We use that to control insects.

So as a consequence we're very energy intensive in freezers. Something like 60 to 70 percent of our power goes into a freezer. Quite a lot.

So that's where solar kicks in. It basically takes us off -- it should, once we get it all up and running, taking us off the grid. In other words we won't be pulling as much power off the grid at all for all of our freezer usage on those hot summer days.

Another project we're working on is this producer gas can be changed into a synthetic diesel. And so the CPC is actually working on that right now. They have the module out doing some of the beta testing on our site last Christmas. And they hope -- actually the Department of Defense has given them a grant to actually produce the first 25-gallon-per-day module. And then we were supposed to get the first one, but the DOD beat us to funding source.

We're looking for funding for this, so that's why I say, grants, please. We're trying to bring this 25-gallon-per-day diesel generator, biodiesel or synthetic fuel generator. And what it does, it pulls part of the producer gas stream out of going to the generator. And especially at those times where we have excess generation capacity, we can siphon part of it out and put it, store it as a liquid.

And so this is why it's helpful. Plus it will offset our fuel usage for our tractors and such. It also is extremely environmental friendly. The initial tests have shown it to be very very good as far as pollution emissions are concerned.

We also want to bring the big brother of this, or big sister of this, the Biomax 100, onsite to use with the rest of the walnut shells that we have. There's a possibility, part of the stream we put out is hydrogen of combustible fuels. And so we can split the hydrogen out of that. And that might be useful in a fuel cell vehicle or forklift.

Walnut oil. We produce a lot of waste walnut oil that's not edible. Takes a lot of energy to press it and make it into an edible product. We want to press it and use it for fuel. It's a lot simpler.

Absorption chiller I already talked about. And then those are the studies we're doing with -- a lot of studies with UC Davis. And we're hoping to continue to expand those studies.

Impediments. We've heard this today. Emissions, soil application, and interconnection. Our mission started down the road of basic idea we probably had to do something to comply with emissions. As I had said, we had a very short turn-around. The CEC grant was due to expire in March. They contacted us in August.

Basically we had to perform and get the thing up and running prior to March. We had a November deadline. There basically was no way to get compliance prior to. Bad boy.

And so we went ahead and constructed it. I also didn't know that I needed to have an authorization to construct, which is not uncommon for farmers to not know about these little small aspects.

So I was served with a notice. We've done a lot of these kinds of things. Very very visible, public kind of demonstrations. We've had probably close to 2000 people onsite. Not at one time, but over the course of the last year and a half.

We got a notice of noncompliance. Now I've broken the law, I'm a law-breaker. I'm listed on the website of the local air district as a law-breaker because I didn't get an authorization to construct prior to construction.

The good news is I found out later on it would have taken me three years to have gotten that authorization. So, therefore, it would have violated the CEC grant. I couldn't have complied with that grant. So kind of like, you know, which way am I going to lose.

So far we do have an authorization to operate. We are under the radar as far as emissions are concerned, I shouldn't say under the radar, we're under the limits as far as emissions are concerned. We are on the radar.

And so far our costs have been somewhere around $12- to $15,000 to get compliance to emissions, or to get the testing done for the compliance. The actual permits didn't cost that much. It was the testing protocols that cost a lot. Because we can't pull off the shelf what walnut shells emissions should look like.

Char ash application. This is really

incredible material, this char ash. And the more I find out about it, the more it's really awesome. You may have heard about the Mayan and the Aztec cultures and the char ash that was so important in their cultures 1000 years ago.

Well, this is a similar kind of compound, if not the same thing. And it looks as though it's going to be the next green revolution in agriculture if we can get this thing worked through. And what that means is that it'll be the fertilizer supplement to the soil that could solve nitrous oxide emissions from synthetic fertilizer being applied, which is a huge deal in California. Agriculture is responsible for about 20 percent of nitrous oxide due to fertilizer application.

It could solve the nitrate pollution groundwater problem. It could solve, or help -- I shouldn't say solve -- help the water situation. It acts like a gigantic sponge for all these things. It kind of holds it, and then releases it over time, so that when someone over-applies, they won't actually pollute the environment. However, the number of agencies that we have to talk to in order to get this done.

The good news is that we just got a CARB grant, actually UCD did, I didn't get it, but I'm involved with it, to study. And so I think we should be able to develop some really interesting information out of it really soon. It may be a really really excellent byproduct of this process.

Impediment three, interconnection. This has been the one thing that has caused me to go more bald and more grey for the last year and a half plus.

Little did I know, we went into the solar. Basically I signed on the dotted line. A week later we had our permit. We were able to interconnect. I thought, no sweat, no fees, no costs, nothing.

I was really wrong. We are in a "Catch 22" situation. And this is where policy and some well-intentioned policy falls apart when it gets into the real world.

All right, so, solar net metering. Like I said, slam dunk, no big deal. But you can't mix that with biomass because it is not allowed due to the solar net metering, okay.

Feed-in tariff. Allows biomass, but if you took any money for solar, which we did, and/or the CEC grant, you can't be part of the feed-in tariff. You get where I'm going with this? We fall through the cracks.

So we can't be in either program. So therefore, we cannot be interconnected. It's as simple as that. That's cut to the chase. It took me a year and a half to figure that one out. I'm kind of slow, I guess. But that's what it boils down to.

We could have been part of, stayed in the net metering program, but in order to do that we would have had to put equipment that caused the biomass, just the biomass not the solar, to not export. That equipment cost somewhere around $50,000. Now, remember, we're only generating $35,000 of electricity a year. And because we can't export we would never be able to pay for it. Okay. We can't, no income.

The similar thing is like I said, is true for the feed-in tariff. In order to connect in the feed-in tariff we were told that the fees could be as high as $50- to $60,000, okay. We'll be able to export if we got around the, you know, the incentive money thing, which we can't. But, again, $50,000 is a lot to recoup when you're only generating $35,000 a year.

So the small people can't play the game is what it boils down to, quite simply.

Now, that $50,000 figure may be wrong. But we haven't been able to get an exact quote as to what the costs would be to go down that road.

So basically what it is is the feed-in tariff, multi MPR, is not high enough to allow us to recoup these costs. And the fees are so high that basically we can't play anyway.

So, what are the global issues. In my opinion, we need to really overcome the centralized power plant mentality. Why do we haul biomass, a low-grade fuel, hundreds of miles like we used to do, to put it into a biomass plant to generate electricity, and then haul the ash away from the biomass plant and dispose of it in a landfill? Doesn't make a lot of sense.

And then you put the electricity into a transmission power line that travels hundreds of miles back to my plant. It's kind of a silly, you know, program. So we need to get away from that.

I have a good friend who I serve on the board with, who is actually really high up in the security issues. And we argued next about the security issue. My attitude is centralized plants are a lot less secure -- and we're talking about terrorism -- than distributed power plant. No one in their right mind is going to come out and kill my 50 kilowatt generator. It's just not worth it to them.

Not all renewable power is green, or it could be made more black. We have a power line project that's going to come through Winters, or one of the possibilities is coming through Winters. It's called TANC. Six-hundred miles going through northeastern California. Solar, geothermal and biomass, I believe, are the renewables.

This is touted as a renewable power. It's going 600 miles; 60,000 acres that that power line will actually take out; it'll be clear-cut through forests; orchards will be taken out. You can't put it over houses, so habitat is destroyed. Pretty silly. Total solar array to generate the power that it actually is transmitting is 22,000 acres.

Now, you got to add, for this project, the 22,000 on top of the 60, to come up with a total impact, acreagewise, you know. So it doesn't make a lot of sense.

Why not put the power on top of the people's roofs. It affects 1.5 million households. That works out to be 650 square feet of solar panels per household. It's pretty do-able. To boot, the $1.5- to $6 billion that this power line will cost, and I think that's low end, and the six or seven years that it will take to construct, and all the environmental permitting and such like, that money could actually be given to those 1.5 million houses and they would have a $1000 to $4000 credit towards putting those panels on their roof. A lot more sensible.

Large solar in the desert, I'm sorry, I'm a plant ecologist. I have a problem with taking out a fragile desert environment to put solar out there. That just doesn't make sense. We're going to destroy another habitat.

Algae ponds. We're talking about algae a little bit in mitigating some of our emissions. One of the proposals I read was to put ponds in the desert. I can't imagine pumping that much water out into the desert and letting it evaporate in ponds to grow algae. Doesn't make a lot of sense. There's other options.

I already talked about the

transportation. So, as I said, I think the solution to a lot of these things is small distributive renewable power. But what we need is information clearinghouse and an ombudsman that will actually help us get through all of these hurdles.

Guys like me, he was talking about L.A., 10 million people and they can effect a change in the law. And I, little Russ Lester, is trying to effect a change in the law, you know. They took ten years. Boy, I hope I don't take ten years.

You know, it's --

MR. SKYE: You need to break the law like we did, just build it.

MR. LESTER: He's telling me I need to break the law and just go ahead and do it. Tried that, didn't work.

(Laughter.)

MR. LESTER: We need to have one-stop permitting. I can't tell you how many different things I tried to learn about. I think I'm a relatively intelligent individual. This is a game-stopper right here, folks. As soon as farmers and ranches see, as she talked about, Nettie talked about earlier, see the amount of stuff that they have to go through they say, forget about it.

This is why your biomass is not progressing, plain and simple. Nobody wants to take on -- you know, you talk to those dairy people. Most of them say, if I knew what I know now I would have never started. And that probably is true for me. I've been at this since November of 2007, trying to get interconnected and meet all the rules and regulations. And we're still not there.

I have a lot of other things to do in my life, you know. This is the most expensive power project I've ever entertained in my life, because my time is worth something, I think. A lot of people don't agree with that, but I do.

It needs to be a simplified fast and a consistent method to rectify the problems that are there. These little wording issues should be able to be resolved without going through the PUC, which is where we are right now. I'm actually talking to staff members in the Chairman of the PUC's Office to try to get this changed.

Emissions. We talked about fuel lifecycle calculations. What she talked about as far as those targeted emissions needs to, you know, the tunnel vision, right on. I mean I can't tell you exactly the quote from one of these regulatory agencies is, we really don't care about air pollution, we care about NOx and the four targeted emissions. That's all they care about, and the fees. Because they want those fees so they can continue their office. And, I'm sorry, but I find that unacceptable.

We need to phase these rules in, as she talked about, for renewable power, so we have a chance to kind of get our wings underneath us, and find out what some of the glitches are, and how we can solve these problems.

These standards need to be, you know, bigger zones. The fact that that pollution, they're shipping gas over the hill to another, dairy biogas, into another district; burning it there; and it's coming right back over the hill in emissions. But that's okay, because it's outside of their district. I'm sorry, that doesn't make a lot of sense, either.

And as I said, you know, we need to look at all things as far as greenhouse gases, not just NOx.

Interconnection. This is going to be really brief. There's actually on one of the back pages there, much more in-depth. We need to merge the rule 21 net metering and the feed-in tariff together. Why do we have two programs? We're trying to achieve the same goal. But we have these divisions that create problems, like me, the "Catch 22" problems.

We, by doing so, and there's a lot of benefits by doing this, it would simplify, it would eliminate conflicts, new technologies could just automatically be shuttled under this umbrella, instead of having to figure out which one they want to go to.

Dairy biogas, by the way, spent I don't know how many millions of dollars in six years -- where's Alan, he could tell you better -- trying to get their dairy biogas included under the net metering. Why are we doing that? Why don't we just make it easy?

You can accommodate change and look where it's -- if I stop being a importer of power, and I start exporting power, it could be easily done when it's blended together. Or if I stop exporting power and I import power, it's easily done. I don't have to go back and re-do my contract with PG&E. It's done.

We can fully develop the RPG, the renewable power generation. Right now the limit on solar people in houses is why would you want to produce more power than you use. Even though you have the roof space. You know, the way they calculate that out is you produce 90, 95 percent of your annual need, because otherwise you're just going to give it to the utility. That's pretty silly when you have the resource up there that you could fully utilize.

It would encourage conservation. My daughter, who works in the business, very conservative. But one of her first comments was, well, I want to put solar on my roof. I said, great. Well, that means I don't want to buy EnergyStar appliances necessarily because, well, gee, if I change and save electricity then I'm going to give it to PG&E. It's pretty silly, but at the same time she's right. So you would discourage conservation.

And simplify the tariffs. There's a whole bunch of tariffs that pertain to renewables. And I think we can get rid of half of them.

So, in order to stimulate the long-term economy and jobs I think we can do these things. We can minimize, you know, our usage of energy, and we can maximize conservation and efficiency. We need to expedite this as a goal.

It's been talked about for entirely too long. It's been looked at entirely too long. There's some really simple solutions to these issues.

We need to embrace distributed generation in a big way, because this is the way we can get a lot of stuff done quickly, using the existing grid we have without spending big bucks on new improvements and major environmental impacts. It's already there.

If I have a 600 amp power panel that means, you know, I can put 600 amps out as easily as I can take it in. It's just that simple. Now, I know there's some electrical issues with that, that I'm not an electrical engineer, but it can be done. Other places are doing it.

And all these goals need to be done immediately, because global warming and climate change, in my opinion, is real. And it's something we need to address today, not in 2025.

And I believe in my heart that agriculture can play a huge role in meeting these goals, in a very very sustainable, renewable manner. And most farmers and ranchers want to do that. They understand the security issues bringing in foreign oil. They understand how to do these things. They do it cheap, that's the way we do things. And, you know, we can do it now.

That's it.

(Applause.)

DR. KAFFKA: We should have just had Russ today, (inaudible).

MR. LESTER: Just, if you want to know more about the company, and my daughter tells me I have to say this, because she's in charge of marketing, is our website is real simple. It's just www.dixonranchfarms.com. A lot of these things are discussed in more depth there. And so is a lot of the things I talked about in the handout, as well.

DR. KAFFKA: Before we take specific questions for Russ, I'd like to invite the other speakers from the afternoon to come up. And I've asked Fernando Berton to kind of handle discussion for the rest of the afternoon.

There's also just a couple of announcements. When we're through our discussion we're going to ask Bryan Jenkins to come up and summarize the day.

After that the reception is going to be, as I mentioned, at the hotel, across the park. And I have an announcement before people leave.

The folks who registered today who didn't get a name tag, we have your name tags. And more importantly, behind the name tags are those two certificates with the ethanol -- so please pick up your name tags before you go over there, so you can get into the reception. And also get a glass of wine or two. Okay.

Any questions for Russ?

MR. LESTER: Just before I start, or before someone asks a question, this is a power project, or power line near my house. They just recently cut all these trees down. These are, well, some of them are probably 50-, 60-, 70-year old walnut trees. And all that brush has now been burned. Air pollution. And now they can no longer grow trees that are higher than ten feet high, which means no trees.

MR. BERTON: I either have to stand on a

stool or lower the mic.

(Laughter.)

MR. BERTON: I think I'll lower the mic. I'm Fernando Berton, and I'm with the Integrated Waste Management Board. You know, we asked the speakers to come up. So it's just another opportunity to have more of an open dialogue on some of the stuff you heard. Whether it's on some specific things, or kind of more global, you know, general kinds of questions, answers, opinions, et cetera.

So, you know, I'll be kind of the one facilitating that. I mean I've got a list of my own questions here that I thought of that could kind of help move this discussion a bit. But, you know, I'll save those for later.

So, why don't we go ahead and start, and start with you.

MR. FUDEMBERG: Hi, Jay Fudemberg, again. This is really for everybody up there. I think, again, we've heard a fair amount of frustration --

(Pause - microphone adjustment.)

MR. FUDEMBERG: Good idea. So this is for everybody on the panel, or really anyone in the audience who wants to contribute.

We've heard a fair amount of frustration from a number of the practitioners, the people who are out there trying to actually do things. And the frustration's been, I guess, most specifically emissions and interconnect, and maybe some of the other policy issues.

What government institutions, what lobby groups are on the side of the people who are trying to do things? I mean is there an association? Is there somebody who can help promote better legislation, regulation amongst all of these regulatory institutions?

Because if it's incumbent upon small- and medium-sized, even larger businesses to try to overcome these hurdles, it's, -- you know, just starting with the air quality boards across the state, you know.

And you've got multiple utilities; you've got, you know, the utility commission, the Energy Commission, I mean you've got so many institutions, so many vested interests it almost becomes just an incredibly daunting task for small- and medium-sized businesses to want to go out and do anything.

Who can be enlisted as sort of a bruiser, you know, a big entity to work on behalf of the small guy across all of these government regulatory institutions, and maybe the investor-owned utilities?

So is there any comment on that? And I'd also invite PG&E to talk about, you know, its perspective on this and how it can help. Because I know that PG&E has, and probably all of the California utilities, have an attitude that they want to foster, you know, some success here.

And so how can we overcome a lot of these obstacles? Is there any conversation on that?

MR. CHRISTOFK: Well, I appreciate, I think I'm the lone regulator up here in the front. And I'm pleased that the lady from San Joaquin --

MR. BERTON: If you could state your name, too.

MR. CHRISTOFK: Tom Christofk; I'm the Air Pollution Control Officer from Placer County. And I don't see -- is it Nettie?

MR. SPEAKER: She's not here.

MR. CHRISTOFK: So I don't have my target on, anyway. Yeah, that's a great question.

And you are so right about conflicts.

And I have to tell you a lot of it stems from federal law, you know, if you have a Clean Air Act and Clean Water Act. And to the extent that you navigate from that down to the state regulations, and then local air district regulations, it is a bit frustrating because, as an air district regulator, I don't have a whole lot of flexibility when I look at a project.

In fact, it's pretty procedural, you know, when the engineering folks look at a project. They go through steps, that is, in accordance with laws. And I say that plural, because some of the laws are in conflict. So aligning those laws is a step.

And it does take somebody with a desire to do something other than the status quo to move things forward.

And I'll give you a couple of examples. Emission reduction credits, that's right off the bat. I think you have a project out there that has a net reduction in emissions, and yet the facility, itself, triggers what is called New Source Review thresholds.

In my agency, because of the air quality status, the entire set of emissions from that facility have to be offset to zero if it emits greater than ten tons of a pollutant that is considered we're nonattainment in.

Now that is a huge problem because there are no emission reduction credits available, even if a business were desirous of purchasing them.

So, what it takes -- and here's the good news, there's a good news story to this -- is there is an active effort to look at that. And there's an organization within the state that is doing that. It's the California Air Pollution Control Officers Association.

I'm pleased to see that there has been movement. We, in my agency, have created the first emission reduction credit program to take emissions from railroad locomotives, which are unregulated at the local level, and are regulated at the federal level, because of interstate commerce, so guys like me don't regulate trains, locomotives and emissions.

And yet we have created a regulation that would allow those mobile sources to be, if they reduce those pollution that emit from them, to be used as offsets for facilities.

Now, that was a huge breakthrough. Sounds pretty simple to do, but it took years and years and years of work. And my board took that, passed it, and we got approval from EPA. So it's a phenomenal breakthrough.

I might say that there's three other projects in the state, climate projects, to do that. And one of them is in San Joaquin. On dairy digesters. So the San Joaquin Valley Air Pollution Control District has committed to do a pilot project to create emission offsets from dairy facilities.

And in the South Coast Air Basin there's another pilot project to take emissions from locomotives -- power units on commuter trains, and use those for emission credits. So that's a positive thing.

On the other side when you're looking at tradeoffs between a greenhouse and a criteria, that's a huge area that is ripe for exploring. And the regulatory agencies that I work with, and I work with a lot of these guys, we're looking at that.

Again, I've seen a lot of initiatives at the local level to push these things forward because of our businesses in our districts. And so they come to our board, you guys come to our boards, and you talk to our elected officials. And our elected officials talk to us.

So I think pushing up is a great way. Unfortunately, it's like pushing a rope. When you push a rope it tends to come back on itself. So what we need to do is we need to push and we need to pull.

And I'm seeing some movement on the pushing and I think, with some of the things that I've heard today, I'm actually pretty excited about the pulling.

So I think we're in this kind of recognition that, you know, we've got national issues that are starting to drive policies that are going in the right direction. And so I generally can say I'm an optimist.

So, who's the bully? Who's the person that's going to push it? A project that goes through and creates success. If we get one or two of these things through, and the politicians start smelling that it looks like success, a win/win, it starts to generate success. And then it just starts going.

That's been my experience. And that's why, in our little agency, in our little district up there, I think we're pretty much out on the edge. And I know from some of the other folks, I mean we're doing things that I think are not the norm.

You know, I have the ability to use discretion within certain limitations, and I'm using that. And if we get a project built up there in the Lake Tahoe Basin, using, you know, technology that is going to lead towards, you know, future, reduce pollution, reduce lake deposition. If we can get it in Lake Tahoe, that's one of those things that we can have success, breeding success.

And by the way, this is transcending, you know, the political spectrum from left and right. It's just the right thing to do. That's why I'm pushing it. And I think there is a way to, there is a pathway.

MR. BERTON: And actually that brings up, for me, is a good lead-in for a follow up question. You know, there's a lot of information that's been presented here. And the question was, you know, who's the bully.

There's, you know, we know who the attendees are, but, you know, conspicuously absent, I think, are the policymakers, the decisionmakers and the legislature.

They're the ones who need to hear this stuff, wouldn't you say? Would you believe that they're going to need to hear this stuff?

So, you know, what are -- short of maybe having, you know, a fund raiser --

(Laughter.)

MR. BERTON: -- how do you get them here?

MR. CHRISTOFK: Well, that's a great idea, yeah, actually. I agree, Fernando, and I can tell you, you know, from a political perspective and legislative perspective, I'm briefing next week at the Capitol some assemblymembers.

We're pushing at the local level, having the supervisors engage. There was a contingency from Sacramento that went to D.C. in the latter part of April. I wrote the issue paper on biomass-to-energy that was carried back to Washington.

We actually have a pretty favorable --

our senators are both very much in favor of the policies we're advocating here today. I think the disconnect is it's just a long hill, and there's just lots of battles.

And like somebody said today, and I forgot who it was, about some staffer at a committee level that basically sabotaged legislation. I mean those folks, we need to just call them out, and address it in a way that they can't hide.

And, you know, it's a career-limiting place to be, but I think that for folks in the government we need to do that. And we just need to keep telling the story. And when that oil gets back up to 140 bucks a gallon again, you know, everybody was screaming. But there was actually some positive things to that for those of us that believe in renewables.

MR. BERTON: So then do you think that the congressional and the senate delegation could help from the top down, effect some change at the state legislating level?

MR. CHRISTOFK: Absolutely. I'm fully committed that the California Congressional and caucus and all that, absolutely should be a player in this. My two cents, anyway.

MR. SKYE: Well, I'll just speak loudly. There's only two things that get politicians out. One's a fundraiser; the other is press. So maybe we can try and get more press to these events. And especially -- I think if the press realize that there is some very interesting stories to cover here about the crazy conflicts in the bureaucracy that all of us are facing as implementers, that I think that would definitely drive the change that we need.

MR. BERTON: Okay. Yeah, go ahead.

MR. LESTER: There are a lot of people that are interested out there. I mean we in the course of a year and a half in trying to achieve some resolution to this, have actually invited and had a number of individuals there, you know. Mary Nichols and Dan Sperling came by. You know, I meet some really neat people. They're all really interested. You know, a lot of the people in this room have been to our facility.

Senator Wolk has been very excellent and her staff have helped me. You know, when she was an assemblyperson I was in her district. Now she's not, I'm not in her district. But she's still helping.

A.G. Kawamura, Secretary Kawamura was out there, too. And we talked about the same thing, of getting an ombudsman and addressing the question here of having a central clearinghouse of information so that people don't have to have a learning curve of, you know, a year and a half or so to try to figure all this out. Or whatever, or hire, you know, a consultant to do the figuring out of this thing. It shouldn't have to happen.

There's been this discussion at the, my understanding, at that level of starting out that person, whether it was the ag department, or you know, the department of whatever, resources or something like that. But they have talked about that. I think now we just need to put feet to it.

The sad thing is then the budget hit and the financial crisis. And sadly, it seems like nothing has really happened in Sacramento since that time, since last fall. So, --

DR. KAFFKA: I'd like to make a comment, too. I think we think about the history of environmental regulations, especially the -- regulation, what we have is kind of a cultural history, as well as a technical history.

In many cases a single regulation has been the passion and the career of a really dedicated individual. So, in other words, air quality reg didn't exist 50 years ago. And now it's just because of the passion of advocates for it.

If you add all those individual battles together you have essentially a non-integrated cultural historical legacy that we have. Now we're at a page in history where it strikes me where we need to have the capacity to do integration and bring that all together. That's easier to say than to do.

But I think that we can't bring just the 20th century mindset to environmental regulations to the 21st century wholly without some modification.

MR. BERTON: Yes.

MS. BLEIER: Just one comment about it. I mean there are, you know, there are some precedents for that. I've worked with natural resource management issues, and you know, a number of years ago Sustainable Conservation, a group that someone else mentioned here today, really put together a whole program for the one-stop shopping around land management issues for watershed permits.

But basically they got local agencies, state agencies, federal agencies all to agree, starting at top levels. They had directors and regional chief from the state agencies signing MOUs. But then they really had to send people around and train cores of staff, you know, staff people, in agencies on the ground. And get them willing to do it.

So it's possible. And I think it was very successful in certain places. You just need commitment and you need to train people to do it right down to the ground level, so.

MR. BERTON: Anybody else want to, from the panel, want to chime in?

MR. LESTER: Well, I just wanted to add one little thing. Is I sort of hit the interconnection issue very hard. And it is a very big issue. And, you know, one thing I got to say is my first reaction when I hit this roadblock was to say, you know, I hope Fred takes this with the right grain of salt, because Fred was one of the first contact persons that I had at PG&E as far as getting interconnection going.

Is that my first response is a lot of people's first response, is that this is PG&E. They just want this, they're the bad guy, and all this kind of stuff.

Since working with him for a year and a half, you know, I got to tell you it's not totally their fault. I mean they've got these regulations that they've got to live within. And they can't break the law. They've got the PUC to answer to, and other things like that.

And they have, PG&E spent an incredible amount of time trying to resolve my little 50 kilowatt generator. Much much more, I mean probably tens of thousands of dollars of staff time involved with this.

But I do think that probably one of the things they should do is to actually pursue, you know, PUC changes. Because they're getting a huge black eye in the PR sense from this. And I've said this to Fred before, is that you know, they spent a lot of money on trying to green themselves up, but it falls on deaf ears when you hear a story like myself.

But, again, it's not -- superficially it would seem like it's their fault, but it's not totally.

MR. SKYE: I think we heard similar comments about the air districts. You know, mostly California seems to be in nonattainment for something or another. And it makes it very difficult when you've got federal mandates that basically say it doesn't matter what the net impact for the project is. You may be significantly reducing the net impacts, but whatever the actual emissions from that particular project are, you have to reduce that down to zero; and in some cases more than zero. You have to offset more than the actual production from the facility.

So, it was mentioned earlier what groups are out there that are advocating, and there are a number of them. I mentioned one, which is a bioenergy producers, they're sponsoring AB-222. But, I think that's definitely a good approach for anyone that's trying to move in this direction, joining those kind of advocacy groups that can speak in one voice.

And all of these agencies face the same challenge. They have their particular mandates; they have their own bureaucracy. It's very difficult to change, even if they wanted to. And there's very little incentive for them to really make changes or to think about things from a systems approach or from a comprehensive approach.

So you need those advocacy groups to help bring everybody together.

MR. SHAFFER: Steve Shaffer, a comment and a question. You know, farmers, the ag industry in California is about farmers, themselves, less than 2 percent of the population.

And so they used to be able to sort of wield a bigger stick because of the assets that they had. But they can't anymore. You know, most farmers are now farming within two miles of the urban edge. And California's an urban state.

So, agriculture also has a messaging issue. And no longer has a constituency, and so has to build that.

Well, the biomass industry is sort of a microcosm of that. So, you need to look at a big sort of outreach effort to develop that constituency, that then the policymakers cannot ignore. So that's sort of my editorializing and comment.

My question, primarily to Fred at PG&E,

is given the prospects of a 33 percent RPS in the not too distant future, what are some of PG&E's strategic planning in moving forward, and how do some of these different issues then play into that?

MR. SKILLMAN: Thank you for the question. PG&E, clearly in support of the mandates that we have, even recently we've had a huge filing, if you will, 500 megawatts. It's specific to solar. But it addresses the point in terms of the RPS going forward.

And it really points out really a kind of a two-tiered approach. In that for this 500 megawatts, half of it is being proposed as PG&E owned and operated. With the other half through power purchase agreements that we'd have from third-party providers.

It is, if you will, a traditional approach in that it's a utility-scale type of project. It's not, say, contrary to what our sister utility, Edison, is doing down south, where they're looking to place 250 megawatts of solar on, you know, an incremental basis on residential and commercial rooftops.

So, clearly that's one of the approaches that the utility will continue to explore, is that, i.e., you know, where is the big bang for the buck, if you will. Utility scale type projects that have, i.e., less risk associated with it when you compare it to a million solar roofs with 5 k systems on top.

So clearly that's one way that the issue's going to be addressed going forward. And looking at those opportunities, whether it's in solar or other renewable technologies, as well.

And I think to tie my next point to the previous question, is that clearly the issue of the environment is a global issue. And leadership across all lines, vertical and horizontal, whether that's leadership at the policy level or horizontally between the various technologies that are considered renewable.

Trying to have the dialogue that is looking at more comprehensive solution, one that also looks at other conventional solutions, as well. As an electrical engineer, say by training, I'm one that sees the benefits and value, if you will, of nuclear technology.

And the point being that the dialogue needs to be more comprehensive. Leadership can come out horizontally and vertically through the various structures that exist.

And I think, as we look forward and we see the dialogue changing, you know, then industries like the biomass industry will be able to leverage partnerships that they have with other technologies.

I think that one of the existing probably frustrations that an industry like yourself, that you have, is that there's a perception of lack of equity with all renewables.

And so once the playing field for renewables is perceived as equitable horizontally, then I think you can leverage more, a broader consortium to really address a much broader dialogue with the policymakers that, you know, hopefully again I believe there's enough room for everybody, from a generation perspective.

You know, I applaud Mr. Lester for what he's doing at Dixon Ridge Farms and the approach that they've taken in terms of sustainability. And this is something that I think we'll hopefully see evolve in the dialogue going forward.

MR. THEROUX: Good afternoon. Great panel. Thank you very much, all, for your work today.

I've always looked at the technologies that we're pursuing as the best thing that we could do, you know, in trying to find the cleanest, the ultraclean system, the best way to approach something.

And it occurs to me that we have lots of laws for best available control technology, and we think of that in piecemeal as to what we should add onto one of these systems.

But, aren't these systems, these conversion systems, themselves, indeed best available control technology? Aren't they the method for incremental mitigation that the EPA wants to see, where we take out an old dirty one and put in a clean new one in a basin?

Why can't we look at these new paths and these new capabilities as the clean thing to do in the same way that we do best available control technology for emissions? Landfill used to be the best that we can handle for what to do with trash. Perhaps it's not now.

MR. BERTON: Somewhere there was a question in there.

MR. THEROUX: Yeah. Can we legislate

BACT for the technologies that --

MR. CHRISTOFK: Let me just talk about BACT for a second. I mean, you know, you do have a new technology, one of the issues is, of course, are there technical consequences of that. You know, and so that's why the new technology typically gets looked at pretty closely. Thus the cost goes up because the source testing, if it does get built, is pretty key. And a lot of the permanent permits are probably predicated on passing various source tests which are set at various thresholds. Not trivial consequences.

So I think there's a risk there from a regulatory point of view. But I agree that, you know, typically BACT isn't defined unless it's technologically feasible, achieve in practice.

So, it's the first ones that's the toughest. And I keep going on, then if it works and it's successful, then it becomes much easier.

But, again, my experience is that, we were talking about politicians. I tell you, nothing gets their attention like a disaster. And so, you know, -- and I think we're heading towards disasters with increased stress on, you know, forests and fuels and fires and budgets, yeah, that's another one.

So, I mean I think there's a circling of, you know, the stars here where I think, you know, you're right. If there was some leadership that could be, you know, if we had a horse that was willing to run this thing at a fairly significant level at the federal level, I think there'd be a breakthrough. And I'm looking for that horse.

But anyways, I think that the technological question, that's why it's not easy at the local level. Plus we get sued a lot. That's the other piece, you know.

There's been a lot of slamming on air districts today, but you have to understand that everything we do is public. So we make decisions and use discretion, we get sued. So that's a practical effect of making a decision that may be -- which is why most air districts don't want to use discretion. They want to use a ministerial process, and it's on autopilot, right. Because it reduces the risk of litigation. Sorry.

MS. SUMAIT: Let me just throw in a couple --

MR. LESTER: If I could tag on that a

little bit. You know, part of it is, you know, I really empathize with the dairy folks in the San Joaquin. It's just they're darned if they do, darned if they don't. And if we don't wake up, we're going to lose our dairy industry to other states or other countries. And that's the bottom line.

They are already looking, they're already looking to move. And I don't know about you, but I don't want my milk coming from Mexico. I would rather have that grown here in the United States. And I would also like to think about, you know, the transportation costs of moving that milk from Arizona, you know, to my table, as being kind of unacceptable waste of diesel fuel.

However, you know, so we're actually -- one of the things that I'm trying to get together a group of individuals for, and some funding to do this, is there's kind of a cutting edge technology. I think we can do it in our district, because we don't have quite the rigid standards that they do in the San Joaquin.

And that's to use algae in tubes, in a controlled, closed, loop environment to mitigate emissions. And it's got a lot of potential, like

80, 85 percent reduction of emissions. And the byproduct is a fuel, or could be a fuel, or a food, or a fertilizer.

So those are win/win situations. We can do it probably, I think, if we get the money and the group together to do it, you know, at my place. They can't do it in San Joaquin because they're being shut down.

So this is where air districts have to have a little flexibility in the sense that all of these places are going to be shut down, and they're going to leave before they even have a chance to mitigate and apply a positive impact into, you know, what we need to do here in the state.

That, to me, is silly. When you have the dairy biogas is a huge resource, I mean huge, as far as energy is concerned. It makes me look, you know, I'm a speck of sand. You know, so they have a lot of potential to do a lot of positive things, and they're being shut down right and left.

MS. SUMAIT: Yeah, I think the concept that was brought out about, you know, the technology, itself, is BACT. I think unfortunately, I mean it's true. In our case, do you put the waste in a landfill or do you put it in conversion technology. Isn't the conversion technology in effect, on an overall basis, more effective and is BACT.

But I don't think our system is configured that way. And it takes, it really takes, you know, someone at the very top, including our legislators, to just decide that we no longer want the status quo.

Developers don't enter into this market thinking it's going to be a cakewalk. But, also we need, you know, there's a communication that needs to happen with the regulators. Most developers just grin and bear it. You know, they get one project and then they leave. That's one outcome.

I just recently been in some other states and sometimes it's the approach. I mean I had air quality regulators that think from how do we get this industry in the state. How do we make the system work for you. I mean it was amazing to me, to hear that from their perspective.

But it takes, I mean in a couple of days I was able to get from top to bottom. And it was consistent all the way from the air regulators to the, you know, the surface water withdrawal, and thinking, well, can I really do that. He goes, yeah, but these are the parameters you can go around.

So, I mean I think it's, we need to make a decision at the top. And I hope it's not a crisis. I mean, ethanol was birthed because, what, MTBE was a problem. So we got ethanol in. So I hope we're not going to be waiting for a crisis to wake up our legislators. And I hope it's a success.

Someone brought that up. I think we can also move them by showing success, showing that it can be done. And, you know, if we hadn't been so bogged down in the process, we were hoping that Lancaster would be up and going to show them it can be done.

So, you know, but I mean I think there's awareness, and we just need to figure out how we meet our regulators half way, perhaps.

MR. BERTON: I have one quick question, then a time check. Yeah. Necy, you mentioned that CEQA, it talks about what the issues, the problems are. But doesn't really discuss the benefits.

Do you think, you know, somehow that that could be flipped so that the CEQA process could be used to show that there is a net environmental benefit over the status quo?

MS. SUMAIT: Yeah, and I guess CEQA allow -- and someone who knows better than I here, but, you know, you can take overriding considerations under CEQA. And so you can make that difference.

But it's still, you know, it's not entertained. I mean, where -- you know, you spend the time. Here we are, we're trying to put waste to, existing resources to domestic fuels.

And we've gone through the permitting process here in California. We've shown that it's a permittable technology. There's nothing wrong with the technology. It can meet regulations.

But it's still grin and bear it with CEQA, and there's no really easy fix. I think, in all fairness to the legislators, they need to see that it can work. They need to be success. And I hope it is more that than another crisis. But companies leaving the state.

MR. BERTON: I'm not sure how much time

we have left.

I think, Bryan, you had a wrap-up at the end, as well. So I don't know if you want to go into that or not, because it's approaching 5:30. So, --

DR. KAFFKA: It is. We ought to probably wind it up.

MR. BERTON: Yeah, I know that there's an ethanol product from a fermentation process that's waiting for us at the Grand.

So, you know, it takes a long time to get things permitted. Well, just a little more patience, I suppose, for that ethanol product.

MR. WICKIZER: May I ask, you haven't had a silly question yet today.

MR. BERTON: No, I'm sorry, no silly questions yet.

MR. WICKIZER: May I ask one?

MR. BERTON: Yes.

MR. WICKIZER: There's been -- a lot of things have been thrown around, individual items and ideas. And I just wondered if looking at considering net environmental benefits and social benefits, if you were each asked as to what would be the most important action or activity that we could undertake to start to gain some of that acceptance of moving towards the ability to do the balancing, the flexibility you've been referring to, what would be the most important item on your list.

MR. SKYE: And we should just go down the road here. But, --

MR. SPEAKER: Repeat the question, please.

MR. SKYE: The question was what would be one take-away thing that each of us can do to move towards some of the goals that have been discussed at the conference.

I think there's two things that I see as really important. One is looking at things from a net basis the speaker was mentioning, rather than just a project-specific approach.

And looking at things from a multi-disciplinary perspective. You were in the Cal EPA building, and there's all these different environmental agencies that are allegedly talking to one another. But I'm sure Fernando will attest it does not happen.

So how can we force that to happen? How can we push that issue? So we just, I think, need to talk about it more; write letters to the editor; develop projects.

I think really building projects and showing that they can work is probably the best solution. And supporting the folks that are out there in the trenches actually trying to develop facilities to the extent that we can, I think is very important.

Otherwise, we end up focusing on new projects and having the most rigorous restrictions and barriers to the new projects. What that does is it forces us to stick with the status quo or to push projects outside of California or even outside of the country where the regulations are more relaxed. And that's really dumb, for so many reasons.

MR. LESTER: I would say, you know, the take-away from my message would be to look at whole systems analysis of anything you do. And not just look at it through those little tubes as Nettie was talking about.

You know, that's something that's critically important. It's surprising how little, how in-often that's done.

I told you we had a CEC grant. Part of

that CEC grant was to be interconnected to the grid. Okay. But part of the CEC regulations prohibit us from being interconnected to the grid, as I explained.

Okay. Those offices literally are only separated by a few doors. The one agency that wrote the regulation, the one agency that required that particular thing. Really, I mean, that's how narrow our focus is. And that's not -- and, again, that's not picking on CEC -- well, it is , sort of -- but I mean it's actually rampant throughout a lot of different things that we have set up in our government.

We can really simplify this process and still achieve what we need to achieve. And we just need to look at it on a whole systems approach. Don't worry about as much about regulating a gnat's eyebrow, you know, when you've got an elephant bearing down on top of you. We just need to pay attention to the elephant and get the job done.

Now, granted, you've got to understand. I'm an environmentalist. I strongly believe in protecting the environment. And if I've given you an impression otherwise, I apologize. Because I'm actually a very strong, strong environmentalist and always have been that way in my life.

So, taking down regulations is something that I don't agree with, but I think we can sure make them streamlined and work together.

MR. CHRISTOFK: I think I'll pass on that, Doug, thank you.

DR. KAFFKA: How about -- AB-33, which would be the global warming, the bill to implement the global warming solutions act that mandates holistic analysis, benefit analysis across all agencies?

MR. SKILLMAN: I agree, certainly with everything that's been suggested here so far. And in the spirit that the question was offered, I'd only suggest that each one of us continue to challenge ourselves and persevere. Because without that, this won't move forward. That the leadership that we've talked about and suggested comes from each of us, one.

The only other suggestion is that insure your children and your grandchildren are steadfast, as Mr. Lester would point out, to not accept the status quo. And to demand more.

There's been, if you will, just to make

the point, a bit of complacency, a bit of frustration because all the issues have been pointed out. And there's clearly not a low-hanging fruit solution this is, you know, that silver bullet that is going to hit the target dead center.

So, we need to do what we can. And we need to assure that we're building on this momentum. And that if it means that our children and grandchildren carry it forward, and that they eventually, it's realized in their time, well, good for them.

MR. BERTON: Anybody else?

Okay, so before everybody leaves, I think that's it for the panel. So, thanks. Let's thank the panel members --

(Applause.)

MR. BERTON: -- for sticking it out. Thank you for sticking it out. And then, Dr. Jenkins will be providing the wrap-up.

MR. SKYE: And you can buy organic walnuts, that would help you.

(Laughter.)

DR. JENKINS: I think I'll be at the reception actually, so.

All right, so I'm beginning to understand the logic here with Steve's appointment of me to stand not only between you and lunch, but also between you and the reception. I think you're to feel all the better when you get there, after you get to listen to me, so.

Anyway, I have only 15 pages of summary to go through.

(Laughter.)

DR. JENKINS: Which, of course, I won't do. You know, we've had this excellent day, at least for me, it's been an excellent day of learning on this issue of net environmental and social benefits, particularly with respect to biomass energy, but I think we've heard a lot of social and environmental issues around energy today, and resource management, waste management and the like, even though we don't have that word in the vocabulary anymore.

But I do want to take the opportunity here before we get too far away simply to thank you for attending this. And Steve will have other comments on that. But also to thank Steve for his leadership in putting this together, and really having an excellent program today. I look forward to an excellent program tomorrow, too.

And also thanks to Steve's staff, who helped him do this. And a number of other volunteers. And so I'll let you thank them.

But I think, you know, it has been an excellent day. We had a number of good talks, and I think Dan Sperling on the low carbon fuel standard, Susan Brown who went over some of the state policies.

Steve, who really put the proposition to us, I think, and in his usual, elegant manner, I should say. And before you can get your drink at the reception today, even though you have a ticket for it, you first have to mark your position on the Dyson-Hansen Scale. And make sure you label your name there, and that will qualify you for your free drink at the reception.

Anyway, I'm interested to see how Steve is going to influence Arnold to think small is beautiful, and trade in his Hummer for his Link, and move around the Capitol in that way. So that I'm looking forward to.

So, we've heard lots of things. I think rather than try to go through any more of this, although I know -- I don't think Nettie is here anymore. I think she probably wins the prize for keeping us awake the longest. But all she's asking for is a chance to try, and she made this point about listening. She wanted the regulators to listen.

But I think we all need to listen. And certainly I learned a lot listening today, much more than I learned speaking. So I think this lesson about us all listening to each other is really fundamental to the way the Collaborative operates. And I look forward to more of this type of activity in the future.

I would also say that I envy Necy in having her shovel-ready project. We're all looking for shovel-ready projects. And I hope she takes good advantage of that.

And, of course, Russ. Russ is always a delight to listen to. I've been in many meetings with Russ. But, of course, all other speakers, as well. And, Russ, although he's the token farmer here, I think, and serving as his capacity as a plant ecologist, he reminds us also to listen, and listen to what not only we're saying and hearing from each other, but also what perhaps all the rest of the world is telling us.

And so let me just say I think we heard a lot of frustration at regulators today. However, in listening to the regulators that we had here, they actually sound almost human. So I think that --

(Laughter.)

DR. JENKINS: -- you know, it's not all bad. However, if you really do have problems, I think you just need to go see Tom, the regulator, Christofk, and -- I don't know, is Tom still here? He's probably over at the reception already. Getting out his bulletproof vest and other armor.

But, you know, I think we do have a problem here in the sense that we certainly have a lot of resource, lots of biomass resource. Although if you compare it to the enormous appetite of the energy sector, it's not very large perhaps.

California has something right now in the resources that we produce, and perhaps consider sustainable, is something like 5 to 10 percent of the energy that we use in the state. Which is perhaps saying something about also the efficiency at which we use energy in the state.

And we certainly have a large market

demand. We've got supporting state policies. And we have an industry that really hasn't gone anywhere in terms of capacity much over the last decade or two.

And certainly for the fuels industry that we built over the last few years, where is that industry right now. I think if these benefits exist that we perceive exist, then why have we not make more progress than we have in this respect.

And if it's only due to price effects, that's one thing. But I guess the question is really are there other forces at work. And I think we've heard some of these other forces today.

I look forward to seeing more tomorrow on the incentives and sustainability associated with bioenergy development instate, and how we might find some solutions.

I think, however, you know, the large number of opportunities that biomass provides also creates large controversies. Somehow we have to come together to seek solutions to these controversies so that we can manage our differences and move forward in any case, to find the sustainable ground.

And being able to define what is meant by sustainability is going to be a very interesting proposition. It has been for the last few years as we focused more intensely on trying to develop definitions for sustainability. And actually coming to terms over standards is a major task before us. And I think we really need to try to get through that task.

I am, however, optimistic and I remain ever optimistic. I think we will find ways together. And I think, at least for this Collaborative, this is the main mission, main effort of this Collaborative.

And I look forward also to us achieving the success which I believe we will. And I think your presence here and certainly dedication of people like Steve and the other speakers on the panel today, and of course, the audience in attendance, shows that there is a strong desire and a true belief that we can move forward.

So I'll stop with that, and just thank you all, again. And turn it over to Steve if he wants to say some concluding words here.

DR. KAFFKA: Thank you, Bryan. We'll

have a little bit more thorough set of conclusions to talk about tomorrow afternoon. And I will thank, by name, all those who helped to organize today's and tomorrow's meeting.

Let me encourage you to have a nice time tonight. I think the crowd has thinned out, so there'll be even more wine available per capita than we had thought. As well as food.

And so please take advantage of it in the Citizen Hotel katty-corner from the building here. It's a lovely newly renovated place, and I think you'll enjoy it.

And I think we'll have a very interesting program tomorrow. And we are, as I mentioned, interested in your thoughts and comments. I don't know if you found those sheets that we handed out helpful or not. If you have, and you want to and them in to us, either tonight, if you're leaving tonight, or tomorrow, I'll collect any that you want to hand in now.

And please make use of them and we'll, as I said, we'll put all your comments up on the website as part of the dialogue, it'll be part of the product of the meeting.

So, have a nice evening and we'll see

you tomorrow morning.

(Applause.)

(Whereupon, at 5:43 p.m., the first day of the California Biomass Collaborative Forum was adjourned, to reconvene at 8:30 a.m., Wednesday, May 13, 2009, at this same location.)

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CERTIFICATE OF REPORTER

I, PETER PETTY, an Electronic Reporter, do hereby certify that I am a disinterested person herein; that I recorded the foregoing California Biomass Collaborative Sixth Annual Forum; that it was thereafter transcribed into typewriting.

I further certify that I am not of counsel or attorney for any of the parties to said forum, nor in any way interested in outcome of said forum.

IN WITNESS WHEREOF, I have hereunto set my hand this 10th day of June, 2009.