CALIFORNIA BIOMASS COLLABORATIVE

SIXTH ANNUAL FORUM

CONSIDERING THE NET ENVIRONMENTAL AND SOCIAL BENEFITS OF BIOMASS ENERGY

VOLUME II of II

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CALIFORNIA ENVIRONMENTAL PROTECTION BUILDING

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Round Table on Sustainable Biofuels

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I N D E X

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P R O C E E D I N G S

8:38 a.m.

DR. KAFFKA: Welcome to our second day of our conference of California Biomass Sixth Annual Forum where we are trying to consider the overall benefits, the net environmental and social benefits in the use of biomass energy.

I have a few announcements before we get started with our distinguished keynote speaker, Secretary Kawamura. Generally at conferences we reserve thanks for those who organize the meeting to the very last minute, and everybody's already out the door.

So I wanted to start today by thanking a few people. This meeting was largely organized by the California Biomass Collaborative Board of Directors. Last year we did our meeting in combination with several other groups. This year we decided we'd do it largely inhouse.

And the people on our advisory committee were Fernando Berton, Alan Desault, Steve Shaffer, Rahul Iyer, Robert Glass, Doug Wickizer and Bryan Jenkins, who, you know, figured out who we would invite; contacted speakers; and did all the detailed leg work that is necessary to have a meeting like this.

Of course, Rob Williams, who works for the Biomass Collaborative and is a consulting engineer in the department of biological and agricultural engineering is very active in helping to do planning, as well, and also running the conference. You see Rob managing the IT stuff as we go along.

And last, and by no means least, is Martha Gildart, who is here sitting behind me at my right in her usual innocuous place. But Martha is, indeed, the key person of probably making these meetings go. She handles so much in the way of detail. And I think actually Martha has been doing this -- is this the sixth one that you've organized?

Martha has been working for the California Biomass Collaborative essentially making it go since 2003. And I think this will probably be her last forum, as a member of the Biomass Collaborative. And I would like you all to acknowledge her hard work over the years --

(Applause.)

DR. KAFFKA: If next year's meeting doesn't run quite so well, you'll know why.

We have one substitution on the program that I wanted to mention. Brook Coleman was not able to make it. He was called away for some hearings and meetings in Washington. Instead we were very fortunate to have Harrison Pettit from Pacific Ethanol to take his place, who will be talking about Pacific Ethanol's cellulosic biomass plants, and plans. And he'll be filling in in that spot.

I also want to remind you all, I'll reiterate what I said yesterday, this is the kind of topic, when we're considering net environmental and social benefits, where all points of view are both legitimate and necessary.

So as I mentioned, we provided you with these forms that allow you to, first of all, make notes about questions you might have for speakers, that you can then use subsequently after the speaker's talk. But also for the discussion session at the end of the day.

But also there's a section where you can suggest ideas for programs and policies. And also make suggestions for us at the Collaborative for things that we might work on, or services or functions that the Collaborative might better undertake in the future to try to advance the use of biomass in a sustainable manner.

So, I'd be interested in collecting those from you at the end of the meeting, those of you who are willing to share them.

So, with that, why don't we just get started. We're very fortunate, I think, to have Secretary of the California Department of Food and Agriculture, A.G. Kawamura.

Governor Schwarzenegger appointed A.G. as Secretary of the California Department of Food and Agriculture in November 2003. That's quite a stretch. It's a long time to survive, I think, in the job. It's hard work.

Since then Secretary Kawamura has represented California agriculture on numerous national committees. For instance, he chairs the specialty crops task force of the National Association of State Departments of Agriculture.

He's a member of the USDA's Fruit and Vegetable Industry Advisory Committee. He's an active steering committee member of the National 25-by-25 Renewable Energy Initiative. And also the Native Pollinator Initiative. That's a nice mix of things.

He's the immediate past president of the Western Association of State Departments of Agriculture. And in that capacity, he's also a member of the board for the NASDA.

Prior to his appointment Secretary Kawamura was an active produce grower and shipper from Orange County, where his third generation family still grows strawberries, green beans and other specialty crops.

As an urban agriculturist he has a lifetime of experience working along within the expanding urban boundaries of southern California.

The Secretary is widely known for his passion for education and his commitment to the issues of hunger and nutrition. As president of Orange County Harvest, a nonprofit promoting agricultural partnerships of organizations combatting hunger, he arranged for thousands of volunteers to harvest and glean over a million pounds of produce for area food banks. His urban community garden projects are nationally recognized.

I think we're very lucky to have Secretary Kawamura. Thank you.

(Applause.)

SECRETARY KAWAMURA: Good morning, everybody. Kind of early in the morning, maybe, I don't know. It's good to be here. Good to be talking about a subject that I think is really dynamic and important for not only our state, but really the whole world at large. And I think today I'd like to just cover a couple of the broader aspects of how agriculture, how our world really is changing and really in agriculture in many other ways in our advancement of technologies and how there's a convergence that I believe is very exciting.

And as we look at it I think I want to start by saying, really change, as you know, either happens to you or you make it happen. And I think in the California context of change we certainly believe, and I think we all certainly have to embrace the concept that changes something we need to choose.

The amazing amount of changes that are coming are just off the chart. A friend of mine, Richard Hamilton, who runs a biotech operation down in Ventura, has made the statement in a number of his speeches that if you look at the Kittyhawk and the timeframe it took to get from the first powered airflight to putting someone on the moon, we all should remember that it took about 65 years.

That is no small achievement. And when you look at nuclear power ramping up and then being applicable to an energy production unit, that didn't take that many years, as well.

And I look at just within my lifetime, I remember, as a kid, seeing mules in a barn that were part of -- they were already retired by that point in the late 50s, early 60s, but they were part of retired muleteams still down out of Orange County when Orange County had a tremendous amount of agriculture.

And so the change that takes place throughout, whether looking at windmills, water wheels, whether you're looking at just horsepower, the old fashioned kind of horsepower, these are things that are going on.

And when you travel around the world you see all of those things still in place. The old technologies side-by-side with all the new technologies.

And I think it's important to recognize and change as we choose to make it happen. It can be dynamic, it can be a leapfrog, it can be something that takes place on a much faster scale, I think, than anything or anybody would have ever predicted.

And I think one of the challenges that we have for us agriculturally is that many people still cling to an idea of agriculture that is deeply rooted in the 20th century. When you ask people what they remember about agriculture, what are the things that come to mind, we find that we get defined oftentimes by the past.

Because we have 98 percent of the people that don't produce anything these days. You might all know 2 percent of the American public is engaged in production agriculture, and 98 percent likes to eat that agricultural product.

It's interesting in energy production and the different kinds of products that are going to come out of our energy sectors, and that's that whole portfolio, I would still guess that it's a very low percentage of people that are involved in actual energy production, the science, the development, the technologies, the business of putting energy and make it usable.

And so we have a very similar challenge

in agriculture and in the production of energy. And actually, I think the two are very closely linked, because ultimately you're harvesting sunlight in many ways, in one way or another, whether it's in the form of food or in the form of energy.

And I think when most of the people don't really engage themselves or are technologically, scientifically challenged and not part of a really true understanding of what goes on there, I think we have a great jeopardy.

And I say that because we look at -- maybe I can best describe it as when you live in the luxury of abundance, the luxury of abundance is something very simple to observe here in our state. We have a propensity for fighting about what kind of food should be on the table. Should it be conventional or should it be organic; should it be heirloom or should it be genetically engineered. Can it be a 365-day supply of a certain thing, or can it be seasonal only. Is it free, cage, you know, -- whether it's a free cage, it's a free range or an open cage, you know.

It's interesting how in our world we're fighting within ourselves for what kind of food should be on the plate.

And it's interesting that carries on into the energy sector. We've got nuclear, we've got petroleum, we've got solar, wind, geothermal. We've got biomass; we've got a bunch of choices, a bunch of alternatives, an abundance of energy alternatives that we get to use, we get to choose.

And yet, what happens when 98 percent of the people, or the bulk of the majority of the people, start to look at these things, what happens very often is people form an opinion on what their preference is for any kind of food supply and how it should be produced and how it should show up on a plate.

And they have a preference for what kind of energy should be produced or not produced. They demonize other kinds of energy. They demonize certain kinds of foods. They make all kinds of pretexts for this is the way it should be done.

And in this luxury of abundance, I will tell you that we see some amazing things happen where people start to push their opinion into the policy area, into the politic of energy, politic of food, and you start to see some of the strangest bills coming out at a time on our planet when 2 million, 2 billion people would just like to have food on a plate predictably. And they'd like to have the ability to turn on a light at night predictably and have access to energy.

And I think one of the challenges we have in this luxury of abundance is the danger that comes from opinion-driven policy, opinion-driven politics that creates a platform, and I call it, for the demagogues to step in. People that will use all kinds of nonscientific information to push a point and create basically a very tough future, a very unpredictable future for many of us.

And I say that, and I've used this quote, actually I think I used this quote with this group before. The quote is very simple. It comes from Henry Wallace, a Department of Agriculture, USDA Secretary and a Vice President of the United States in the 40s. But he has this great quote. And it says, "When science fails to furnish effective leadership men will exalt demagogues and science will have to bow down to them or keep silent."

And I think that's one of the biggest

challenges that we have, is that the science community needs to really step up and open up people's eyes and invite them into the 21st century. Because if we don't, we are stuck in the 20th century with a lot of preconceptions, a lot of misconceptions, a lot of challenges in beliefs. And when people believe things it's very hard to change them. Isn't that right?

Now, one of the reasons I say that is that our means of communication these days is just, is changing as well, in front of us. We all read about the demise of newspapers actually around the world, or especially in the United States. That whether "The New York Times" is going to be able to survive; whether "The L.A. Times" is going to survive. The collapse of many other newspapers, "The Chicago Tribune."

This means of communicating and having the ability to educate folks means that it's not going to be available And when a very small percentage of the public anyway is reading newspapers and getting their news in other places, this also speaks to the challenges of is that news or is it opinion. Is it information or is it agenda that's driven out of propaganda, or some other motive to try and get people to believe a certain way.

Now, I can say a couple things about what this means in the future. And I think it'll take us back, when I finish up my remarks here, to where we all need to be, which is eventually on a similar page. Those of us in agriculture; those of you in the energy community working with biomass.

I had a chance to be India about two months ago. I was there for an international sustainable development conference that was dealing specifically with climate change. And the reason I was there was basically to help voice a very strong opinion that nobody's really talking about, the impact to agriculture as it applies to global climate change.

We can talk about what kind of car we're going to need to drive in the year 2050 or out ahead. We can talk about what kind of energy systems we might want. But the challenges that I see, and it's a very, if you will, it's the inconvenient truth that I look at every day, as a farmer, myself, is that unpredictable weather means unpredictable harvest. Very simple.

Nothing more complicated than that.

Unpredictable weather that is changing climate patterns, that is bringing in the opportunity for invasive species or native species to suddenly bloom and have an effect. The food systems, the forest systems, the ecologies.

We recognize that with the fires that we have, for example right now the catastrophic fires that we see, all of these kind of changes create impacts upon a watershed, which then affects the food supply.

A drought that we have in this state is unprecedented. To see how quickly a drought globally, whether it's our country, our state, or whether it's northern China, whether it's Argentina, whether it's Australia, how quickly it can affect the food supply.

Now the challenge here that I see is there's things that are predictable and things that are unpredictable. Those of us in agriculture, those of us who actually are farmers, think about it this way. And maybe this is the easiest way I can tell you.

When we buy something for our farm, for our ranch, we invest in the predictability of the outcome. If I get a new seed, or a new irrigation system, or a new tractor, it's because I know that that will enhance the predictability of my outcome.

If I sign up for a new weather system survey it's to give me one more chance to have some predictability in what my outcome with my harvest, with my production is going to be.

In this arena, you can see that there's a lot of predictable challenges for us as we move forward, whether it's with global climate change or even if you don't look at global climate change. Because if you don't look at global climate, let's say nothing's happening there. Just put that on the sideline.

We know that predictably by the year 2050 supposedly we're going to have 9.something billion people on the planet, right. And if everybody on that planet, if everybody on the planet is just going to have a western European diet, not an American diet, but a western European diet, supposedly we're going to have to double our production and our output.

Now, people argue, I get people that complain and say, well, we can end hunger today.

I agree 100 percent. We could end hunger today on this planet, we could certainly change diets on this planet. But just putting that aside, the fact that if we have 9.something billion people on the planet, we're going to have to feed them. And that's a lot more than the 6.something billion that we have now.

And in doubling that capacity let me tell you about some of the infrastructure challenges that we face. When we were in India we were told very clearly by a lot of people reporting on what's going on in the developing nations, that almost half of the production that they're producing currently, half of the production in Africa and in Indonesia and India, is not getting to the table. It's leaving a farm.

But because of the lack of infrastructure. And in infrastructure, that actually needs to be driven by an energy system, whether it's roads, the building of roads, whether it's processors, coolers, whether it's processors that can turn a product into a cooked nonperishable product. Whether it was the different ways that you store things.

All those infrastructure things that we

take for granted here in the United States are driven by energy products that have to maintain and keep them up and running.

So when 50 percent, half of the food that's being produced in these third world nations, is not getting onto the plate for a lack of just common infrastructure that we take for granted here in our luxury of abundance here.

And I think that has an enormous challenge up ahead of us. So what has to get done in terms of our buildout and building of an infrastructure that's going to feed a planet with 9.something billion, in the face of predictable weather change.

This goes back to then what I would say is the challenges of deferred maintenance in our infrastructure system. I can talk to you all day about how short-sighted it is for us not to have addressed, and not to be addressing our water situation. And whether it's a regulatory drought or a real drought -- and we actually have both going on in our state -- we have some big challenges ahead.

When you look at infrastructure that deals with example in our department just keeping invasive species out of a forest canopy, a gypsy moth, or something that would devastate some of our forest canopy, that is connected to things like catastrophic fires.

That is connected to things like environmental collapse of local ecosystems. That's connected to some of these other challenges we have when we're looking at predictable challenges from global climate change.

And so you have to start to recognize that we have a lot of years, some 10,000 years of experience, recognizing that these are things that we see. There's an infrastructure that should be in place to help us deal with the predictability of challenges to that resource base.

Now, the reason I say that is let me tell you a story of two countries. And maybe they'll put it into a little bit more focus. And then we'll talk about specifically California.

But the two countries I want to talk about is Australia and the Netherlands. Australia, as you know, -- how many of you might have had a chance to read "The National Geographic" articles talking about their drought?

They have had a drought, about an 8- to

10-year drought, depending on who you talk to, and depending on what region, but it's so severe over these last couple years it's driven their ag sector down by 50 percent. Half of their ag production has been collapsed because of a lack of water, because of a lack of building infrastructure for that predictable drought that they knew would eventually come.

They have a rice industry, they had a rice industry. It's down, shut down 98, 99 percent. It, along with their dairy industry, which is off by maybe 50 percent. Their beef industry which is down as much as 60 percent. Those different industries have collapsed.

They save water. They basically, for those of you who understand that the challenges of property rights and the challenge of water rights, basically when you get into that kind of a drought, in a country, your conception, your notion of property rights and water rights is thrown out the window, Because the government steps in and says, you're not watering your lawn, you're not watering your car. Oh, you're not going to grow rice anymore because we're going to move the water over here to this guy who's got some tree crops and some wine, because wine is a more valuable crop.

And you start to see an enormous change in a way a nation goes out and starts to protect itself economically and in its just normal systems for being able to assure that the toilets flush.

Now, all of these things are challenges that could have been avoided. We're looking at them right now. We're three years into our drought. We don't know what next year or the next year or the next year is going to bring. But we can certainly see from Australia that they're ten years into a drought. What can we do now to help ourselves out.

So that's one point. That's one country, Australia. A predictable challenge that they are in the middle of crisis management right now instead of strategic management that could have helped them avoid some of the challenges they have today.

The Netherlands is a complete different story in this tale of two countries. The Netherlands, as you know, many of you know, is a fairly remarkable country. How many of you, when you were little kids, and there's most -- I see some grey hairs in here, so when we were kids you used to see the pictures of the little Dutch kids putting their fingers in the levees, holding back the floods.

Well, you would know, that came from enormous North Sea surges that put their country under water in the 1950s. And their entire country, as you might know, is 60 percent of their country is below sea level. Sixty percent of their country is below sea level.

And in the 50s they said never again. We are not going to have that. In fact, we're not going to survive the next storm surge. We're going to thrive, we're going to live through it.

And we had some engineers from the Netherlands in our office just recently. They had come up from Katrina, from New Orleans, where they were helping with the Katrina rebuild of the levee systems down there.

And we're sitting there talking, and they said, yeah, we've got some great seawalls because we made this commitment to save our country and really get ourselves ahead strategically of a predictable problem that we knew would happen again.

And they told us that they've built their seawalls to withstand a one-in-10,000 year storm. And we fell off our chairs. And we said, one-in-10,000, you mean 1-in-1000. You know, there must be translation problems here. Because we've got 1-in-100 year levees that don't work very well, right.

(Laughter.)

SECRETARY KAWAMURA: And they said, oh, no, we've got 1-in-200, we've got 1-in-500, we have 1-in-1000, but our main seawall is to protect our country from ever flooding again. We've built to a 1-in-10,000 year level protection system.

And we all looked at ourselves, and we said, my god, these guys have no intention of surviving a storm surge. At this point they have no intention of just surviving global climate change. They're going to live through global climate change, whether it's closed environment agriculture that's protected from rising oceans. They're just going to build themselves a future that they want.

And this goes back to the choices that we have. You choose to have a future or something happens, and change happens to you.

And I think I want to basically then talk about just lastly why, in California, we've got to get it right. And we have an enormous amount of people working very hard, Steve and your folks. You guys have been doing some of the greatest work, both Steves, Steve Shaffer's here, too.

But you guys have been working hard in these trenches trying to really ramp up a new future for us for so long, and it's right there. We can see it. It's exciting.

We know Governor Schwarzenegger has -- our Governor has put much focus on being the most environmentally sound nation-state, if you will, in the world. He wants us to do it. He wants us to do that while still accomplishing our economic gains.

This is no easy task, but it takes a lot of imagination, and it takes a lot of belief that we can build ourselves not a survival state technological profile here, but a state that really gets us thriving into this next century.

And I recognize that whether it's looking at our process in my department, which is our ag vision process, which will be finished here in late summer. We're trying to put together a blueprint to take us out to the year 2030.

We know we've been working -- and a blueprint for what can agriculture can look like in the year 2030. Many of you, some of you might have been helping us with that process, and it's pretty exciting.

In that process we're talking about all kinds of, a portfolio, if you will, of agriculture. In there, of course, is a portfolio for energy production from all the different kinds of agricultural products.

This challenge that we had recently of indirect land use change. I want to thank many of you who worked really hard to, again, elevate the fact that we have to let science, going back to this point that we have to have science driving some of our policies, science and facts driving how we make our assessments, how we look at the ability for new technologies to suddenly make an old condition change.

We need to recognize that so many of these converging new technologies, I like to call them technologies, I think you've heard me say before parallel efforts to make our state better are great, but parallel lines never meet.

We've got to converge our efforts across the different agencies, across the different sciences towards a vision of what we want to accomplish here in the state, knowing that predictably that if we don't, we've got enormous problems ahead of us.

And by then focusing on what we can get done, with the technologies of the day, knowing that you have an infrastructure in place that allows us not to slip along the way, I think that's where I continue to say, we'll be working hand-in-hand with all of you to make these things happen.

We know that there's dollars in the farm bill that help us get into the energy arena with energy products. We know that we have a 21st century Secretary of Energy in Stephen Chu out there who's really, I think, opening a lot of eyes.

We know that we have a 21st century Secretary of Agriculture in Tom Vilsack, who sees things very differently than other secretaries of the past. And we're hoping very clearly that this new way of looking at things does open up again the ability to communicate and move opinion to where it should be, guarded opinion.

You can't argue with folks who are very concerned about the kinds of advances, whether it's genetic engineering, whether it's in new technologies, whether it's in nuclear, whether it's in solar.

These new ways of looking at things catch a lot of people offguard, and they protect their vested interests, as we know. That's not new; that's not different. That's something that you would expect.

So in the predictability of that we have to do a better job of communicating. And this gets me back to the end point. What is the way that we communicate with each other better with the public.

Speaking to the choir, I think everything I've said today is somewhat understandable by all of you in the -- I hope, all of you here in the audience. But I continue to say that I see some enormous challenges when, in our own department, we have just a lot of people that are distrustful of government. And so this is a Department of Agriculture department, that they're distrustful of government, they're distrustful of businesses, big businesses. They're distrustful of science. They're afraid of it. They're not quite sure they understand it.

We know that we have to do a lot of work towards bringing up, I guess raising the consciousness of what's possible in the 21st century. Recognize that some of the problems, and some of the challenges that came out of the 20th century, from incomplete science, from sloppy science, from sloppy environmental regulation pertaining to some of the tools we were using.

You can't deny what's in the past. But you can't cling to it and make it stop the future. And I think that's really my point here is we're excited, we're excited that these kind of conferences help bring everybody's consciousness of what's possible up to another level.

We're excited that we know that there's resources, whether in the form of stimulus package money, which we'll believe it when we see it. But there's some really great activities going on across the different agencies right now, trying to gear up and bring in some of the stimulus dollars.

And then we see just some great, old

fashioned entrepreneurs that are really making a difference.

My last statement is this: I wish, and I hope, with the Governor's help, and whoever comes in these administrations after us, that the early adopters are not punished for going out and trying to make change, significant change, enormous and important change.

In fact, they're embraced and they're really given a platform from where people can say, wow, these guys are really trying to get something right. And I want to say thanks to those of you who are out there who have been early adapters, early pioneers, visionaries, and really getting the job done.

Because it's starting to get to the point where I think we can all embrace this future. Okay.

So, thanks a lot.

(Applause.)

SECRETARY KAWAMURA: Yeah, take a few questions, I guess, if that's the way.

DR. KAFFKA: Are there comments or questions for the Secretary? As yesterday, please state your name.

MS. FULLER: My name is Nilva Fuller and I'm a partner of a company named GreenPYRO. And I have some questions for you.

First, if you're familiar with the works of Dr. Johannes Lehman on the biochar production.

SECRETARY KAWAMURA: Biochar, okay.

MS. FULLER: Yes. And what's your opinion about it.

SECRETARY KAWAMURA: I'm familiar with it enough to know that it's one of the portfolio, I guess one of the different technologies that are available.

I don't know a whole lot about it to be able to answer questions. The best thing I can say is it's --

MS. FULLER: I produce it.

SECRETARY KAWAMURA: Um-hum.

MS. FULLER: And my company does it. And we have this proven in lab that the biochar does have the capability of holding the nutrients. And we have the technology that we can customize the biochar and complicated, you know, -- and it holds the water. So you can save a lot of water. And feed the soil, put some nutrients into the soil so that your crops grow stronger.

My --

SECRETARY KAWAMURA: I can tell you that I know for many many years we've used a lignite product in our fields to use as a carbon base for microbial feed in our fields as a part of soil conditioning to try and build up the microbial populations. So I'm just, again, slightly familiar with what you're saying.

And if it enhances that soil building capacity that sounds fantastic.

MS. FULLER: Thank you.

SECRETARY KAWAMURA: Thanks.

MR. BERTON: Yes, Secretary Kawamura. Your statements about kind of opinion-driven policies and stuff versus science-based policies really struck a chord with me. Because it's something that what I've been dealing with and people that I've been dealing with on the outside. Have, you know, been struggling with.

And, you know, you've talked about vision, and we have a lot of visions and a lot of goals in California. So, you know, while the goals may be visionary, I think the means to achieve those goals are stuck in myopic opinions.

So, I mean how would you -- any opinions that you have on how to get, you know, science-based rules. Like, as an example, the low carbon fuel standard, or renewable energy kinds of materials. How would you insure that, you know, the real science plays the primary role in developing public policy, rather than politics, itself?

Because invariably it seems that the policies that we have to implement are very difficult because it's based on opinion and not real science.

SECRETARY KAWAMURA: Well, there's a couple things that I see that have really helped in our arena, is getting folks out to come and visit, whether it's a laboratory or a field demonstration, a pilot plant.

Seeing is believing in so many ways, and I think so much of what we do is we get to see glimpses of a concept, of a technology. You hear an opinion of it, or you hear something. But when you can really bring people out, and I think part of that is what's missing is this loss of contact, you know, the legislators, the regulators.

If we can make sure they have a chance to get out and see what's really happening in this amazing world that we're in right now. And that's not to say that many of them aren't doing that, they are. But I think more and more you get them out there. Then you start to see believers.

I went to Russ Lester's gasification plant, and that big mountain of walnut shells that he's basically putting into an energy source. That's believing. You say, wow, here's a guy that's just decided this is what he's going to do.

When you go down and see some of the methane operations down south and they're scrubbing that methane and putting it into a natural gas line, that's seeing is believing.

When you see there's different technologies, or whether it's taking plastic and driving it back into crude. Whether it's this micron grinder that we just heard about the other day. These are all pretty exciting things that prepare products -- for fermentation without cooking.

All this kind of stuff, I think, takes us -- we almost -- as you know, as you all know, it's exciting. Almost every month or two months or three months someone's coming along with a pretty significant advance in a specific area, in solar, in nanotechnology, in these different areas where suddenly you realize there's a time-saving sequence, or there's a new way to do something that otherwise was taking more carbon demand.

I don't know if I'm answering this question, but I will say having collaboratives, when you have many partners, showing something can be done is very very helpful for guys like us and the regulators, to show that this is not just some pie in the sky, this is a bunch of folks that believe, that believe in their science to the point where they vested and invested in it.

And that, all by itself, sets in motion, I guess, a kind of an open-mindedness. And I think that's what we need, too, is an open-mindedness to embrace the new.

MR. BERTON: Well, and I guess I'm expressing a little frustration because, as, you know, there's a colleague of mine who works for Los Angeles County, and others that work for the city of Los Angeles, who invited legislators, legislative staff, environmental groups to tour some of these facilities. And they say no. It's like they don't want to be educated.

So, I mean, --

SECRETARY KAWAMURA: If I could just say one thing. When people don't recognize they're stakeholders in your good outcome, that's a challenge I have in our Department of Agriculture. We have a lot of folks that don't seem to care whether we're successful or not in the outcome of the different things that we have to conduct.

Let's say it's an eradication of an invasive pest. When we haven't been able to convince them that our actions, our success, actually makes their life potentially better in some small way, or some significant way, then there's some messaging or some communication effort that hasn't taken place. Because we've been lost what should be a normal stakeholder support or someone who's helping us to be successful, because it makes sense for the community at large. So that's maybe one of those areas.

I'm sorry, go ahead.

MR. STANGL: Greg Stangl, Phoenix Energy. You know, ever since the appointment of Dr. Chu, we keep hearing a lot of this, you know, we got to get the science back in the debate, and the time -- give it away, but I'm not a scientist.

And I wonder --

SECRETARY KAWAMURA: Neither am I.

MR. STANGL: -- the science isn't particularly clear on a lot of this stuff. I'm in the biomass gasification business, and I find, you know, for every report that I get presented that says, biochar is the greatest thing since sliced bread, you know, I've got another one over here that says, oh, you know, there's benzene there that you got to worry about.

And I guess in the meantime, in today where the science is not particularly black and white, how do you still get that portfolio of solutions out there?

SECRETARY KAWAMURA: It's one step at a time. I recognize that when you have, many of these situations when you can convince someone to invest in a new technology, and they embrace it and they put their dollars into it. This is, whether it's irrigation technology. In my little world that's something I understand very easy. Or a new energy system like I mentioned with the gasification plant up there at Russ Lester's place.

The fact that they've been convinced

enough to take money out of their pocket, invest in a predictable -- their prediction is they can save themselves some money; they can help with their environmental footprint. They're doing that for a reason.

The way I look at it is then the science then helps really validate your outcome, right. Because you're already creating an outcome and it's visible, it's expected. It's so tangible that you're investing in it.

And the science then just helps to continue to underline why this is a good investment. And pretty quickly, if it's not working, you know, the guy loses the money and he's out now.

The tragedy is if the state or the U.S. Government is making it so hard for that investment in the new technology to succeed, and that's where we've really just got to work, just to continue to work and work and work so that there's a chance to embrace these.

When they don't work at the levels we're at, then we'll find -- you know, you can figure that out pretty quickly. And that technology may then end up being on a branch, an extinct branch on some evolutionary tree, right.

And we see many of these going this way and that way. But the rest of everything else, you know, we're evolving. We're trying to evolve by choice. Maybe that's the point.

We're not trying to push down the evolutionary options we've got. We're trying to really actually crank them up, seems to me. So, I don't know if I answered the question.

MR. STANGL: Thank you.

DR. KAFFKA: Two more, but they have to be short.

SECRETARY KAWAMURA: Okay. My answers need to be short.

MR. MATTESON: Okay, I'll try and make mine short. I would like to come back to your discussion -- Gary Matteson from Mattesons and Associates.

The infrastructure improvement could enable the supply of food to meet the demand. I think that was your thesis about when you came out of India. That if they could, they were producing the food but it just wasn't getting to the people who wanted to eat it. And the reason was that the infrastructure wasn't there.

SECRETARY KAWAMURA: Part of it.

MR. MATTESON: And my question is that infrastructure's going to require energy. And has anybody measured or made an estimate of -- or determined if that energy is available?

SECRETARY KAWAMURA: And I think that's a great question. The energy needed then to put that infrastructure predictably into play and making sure that it's running on a regular basis, in the face of global climate change, is a big challenge.

It's one of those topics that should be at the top of a list of what will happen here in the next 30, 40, 50 years predictably, if it's not in place, if we're not invested, if we're not building an infrastructure.

And then just one quick comment, so is that -- even if you have that infrastructure fully in place and it's operational and it's running, you still have hunger.

I was -- just yesterday we were giving out senior citizen food stamps for farmers' markets down in Riverside. Our department was able to rescue one of those programs and we were handing those out.

We have hunger in the United States even though we have great infrastructure. And the reason hunger exists in the rest of the world is more political than logistical. Nonetheless, that does still exist as a horrible challenge in those under-developed countries that you can produce some food, not very good yield per acre. But you can't even get it to the plate because other things aren't in place.

So we do need energy all along that line of productivity, that dynamic, if anything, is going to be predictably better in the future. So I wish someone would do that study. Yeah.

MR. BRENDEL: Hi. Alex Brendel from AlgaeFuel.org. Besides fuel from algae, I'm really also interested, as a couple other people have been, in biochar.

And you said just a minute ago something along the lines of a group of people pulling together can show politicians that there's a new, real technology underway. Well, I'd like to let you know I'm reading from my own calendar here.

There's a biochar conference that's coming up, a symposium. And it's the North American Biochar Conference in Boulder, Colorado.

And, as Secretary of Agriculture, I'd really like to see you there. I think that would be great.

(Laughter.)

SECRETARY KAWAMURA: I would love to be in Boulder, Colorado. But, please do, do send an invite. And if I can put it together, I would certainly make every effort to come.

MR. BRENDEL: Okay, for the rest of the audience it's Sunday, the 9th, through the 12th. I'll be there. It's in my calendar. August. August.

DR. KAFFKA: I think the last comment, and many of the comments of Secretary Kawamura has mentioned about yesterday I was here, the day before I was there, rumor has it that he's even appeared in two places at once. I don't know if that's true.

(Laughter.)

DR. KAFFKA: I think we're blessed to have such an energetic and deeply committed public servant in California. Let's thank him for his appearance.

(Applause.)

DR. KAFFKA: Okay, we're going to march along now with our technical part of our program.

We're going to be talking this morning about incentives for biomass energy use in a kind of broad sense.

Our first speaker today is Gregg Morris. And Gregg has been a board member of the California Biomass Collaborative for a number of years. I don't know actually how many because he's been involved with it much longer than I have.

He has at least two decades of very diversified experience and accomplishments in the energy and environmental fields. He's an expert in biomass and renewable energy systems, climate change and greenhouse gas emission analysis, integrated resources planning, analysis of environmental impacts, resource management practices and electric power generation. And many other areas.

In fact, Gregg, I think we should make you king, and let you set all these policies with this background.

He has a PhD in energy and resources from UC Berkeley. He's made major contributions to the understanding of environmental costs and benefits of energy generation from biomass, and is published widely in this area.

Thank you, Gregg.

DR. MORRIS: Thank you, Stephen. And thank you, everybody, for being here and being interested in biomass.

I guess in the program it says that I was going to talk about carbon tax versus cap-and-trade in connection with this conference. And when I saw that I said, I don't think so. Not only is that not really a biomass-specific kind of inquiry, but I just don't want to jump into that.

But we're here to talk about biomass and think about biomass, and how biomass might fit in. And I hope, benefit from the coming efforts to control our greenhouse gas emissions. And if we can make biomass a part of the system I think that would be great, and we'll all be better off.

But as we talk about biomass I think we need to start out thinking about what about renewables in general in California. And when we talk about renewables in general, we have currently a 20 percent renewable portfolio standard law in the state that says we, as a state, should be 20 percent renewable in our electric supply by next year.

And we already all know that that's not going to happen. In fact, if you look at the slide here, we have an annual procurement target that the utilities, by rule, should meet. And that's in the red line. And that goes up as a minimum 1 percent per year. But by statute it's 20 percent in 2010. So you see that we've let that sort of go up as a small rate of increase.

But in 2010 it's going to jump up.

When we first started the program we were actually above the minimum requirement, that's the blue line. And we've, since the program begun, we've actually gone down in our renewable content every year through 2007.

We finally reversed that in 2008 and managed to increase the renewable content of our -- and this is now I'm talking about the three large IOUs, three large investor-owned utilities, PG&E, SCE and San Diego Gas and Electric.

And frankly, between the three of them, they procure more than 90 percent of the state's renewable energy. So everybody else is in worse shape when it comes to renewable procurement.

And while they did increase their renewable content in 2008, it's still less than 1 percent above 2007. So, in effect, they actually managed to lose ground again in 2008 in terms of keeping up with their annual procurement target.

And, of course, considering the fact that it jumps up greatly in 2010, we all know that there's no chance at all that we will achieve 20 percent in 2010.

If you look at this sort of purplish line that starts in 2008, that is the collective of the three IOUs, their projection of what their renewable procurement will be over the next three years. And you can see that there's a little jump up in 2009, and then it starts to flatten out again.

And while the utilities are now sort of saying, well, we'll make 20 percent by 2013, I don't see that happening. I also put in what happens if the procurement increase on behalf of the utilities is less than what they say it is. And it has been less every single year, so I see no reason not to believe it will be again.

And you see even lesser rates of increase just to make the whole situation of trying to meet this standard all that much worse.

Now, let's project it out to 2020.

Because our Governor's energy policy, by executive order, our Energy Action Plan of the state, the CEC and the Public Utilities Commission, jointly. The ARB's scoping memo for implementation of the AB-32, the greenhouse gas law, all say we must meet 33 percent by 2020. And, in fact, we'll probably have that in statute by the end of the year.

So what does that mean? Well, I put sort of projecting out the annual procurement targets in blue in two different ways. One with a 1 percent increase; and then the jump up in the final year, or linear projection. But it doesn't really matter that much.

I've shown in red what I consider to be a market reasonable scenario for how we could hit 33 percent in 2020. And that's just basically a logistic growth curve going from where we are today in 2008 up to 33 percent in 2020. And you can see that we are going to require some hefty growth in renewable generating capacity between about 2010 and 2016.

It can be done, but it's not looking good under the system we have in place right now. There's no reason to believe that we're going to make anything near this unless we really make a much more effective RPS program. And I sincerely hope we will.

What about renewables and greenhouse gases, because that's really one of the underlying rationales for why we're pushing renewables to begin with.

Is the basic principle renewables are carbon neutral. They produce renewable energy without emitting fossil carbon emissions.

Now, the renewable energy credits, which are the counting rights to renewables, in California, contain the attributes of the avoided fossil fuel use for carbon. So what that means exactly is not yet determined.

But in any case, we know the renewables do not, or maybe I should say should not need emissions allowances. They do not generate offsets based on the avoided fossil fuel use because if there are offsets available from that avoidance of fossil fuel use, it's part of the REC. So it's already been claimed. Whether or not there'll be an actual value to it is yet to be determined.

But that's basically where renewables

sit. Don't need offsets -- pardon me, don't need allowances and don't generate offsets.

But what about biomass? Because biomass is a really special case and a really complicated case, because after all, biomass uses the carbon in the atmosphere and the biosphere, and cycling between it. So, it's much much more complicated than any other renewable, or any other technology for that matter.

We can take biomass residues, we can produce fuels and energy. Those things have impacts from air pollution to greenhouse gases and so forth. And those impacts have consequences, public health, climate change.

But if we don't use those biomass residues for energy, then something still has to happen to them, because they are, after all, residue and waste materials.

They will be open-burned or possibly landfilled, or we won't go and thin our forests. And if that happens, those fates have their impacts and consequences. And in addition, we'll be using fossil fuels to make the energy that we didn't make for the biomass residues.

So, when we think about the impacts of

biomass, we have to think about it on a net basis. It's the energy system impacts less the impacts we avoid by using those residues productively.

And so what about the actual greenhouse gases? Well, it so happens, I think everybody should know this, that when you have a biomass power plant you're pumping out more CO2 than a coal plant per unit of energy produced. It just so happens that biomass is a low-grade carbon fuel.

However, that carbon is what we call biogenic carbon. It is part of the linked carbon system between the atmosphere and the biosphere. Of that stock of carbon, about two-thirds is in the biosphere and one-third is in the atmosphere. And there's a great deal of annual exchange.

So when you use biomass you're not producing new carbon to the system. You're just using the carbon that's already part of that system. Fossil fuel use, of course, is digging carbon out of geological storage and pumping it into the system. So it's new carbon; it's a whole different deal.

But it's much more complicated than that when it comes to biomass. That's the carbon-neutral part of the story.

But the fact is that you've got these two linked stocks of biomass, of carbon, pardon me, in the atmosphere and the biosphere. You can push it one way, or you can push it the other.

You can have more carbon sequestered in the earth's forests, and therefore less in the atmosphere. And you can certainly go the other way, too.

In addition to that, we have this interesting backdoor that when biomass carbon returns to the atmosphere, it can return in either a chemically reduced or oxidized form. Reduced being what I call, I've shown here as methane, oxidized being CO2.

It so happens that methane is a far more active greenhouse gas than CO2, by about 25 times on an instantaneous basis. And what happens to methane in the atmosphere? It eventually oxidizes and becomes CO2. So you have this sort of process there that's very significant how that biomass carbon is returned to the atmosphere.

What we find with a mix of residue types that we use for energy production in the California biomass fleet, and we have about --

I'll talk a little bit more about how much energy we produce from biomass in California, but we have about 31 operating plants; about 650 megawatts. And they produce about 1.5 percent of California's power.

And what I'm looking at here is all the fuel that was used by those biomass plants in 2006. They avoided a certain amount of fossil carbon. And we're assuming that they're avoiding a mix of coal and natural gas-based load generators.

And so you see that all that biomass, pardon me, all that fossil carbon would have come out in the first year and slowly clears from the atmosphere.

The biomass produces a whole lot of emissions the very first year, of course, just like the fossil fuel carbon. But over time -- but you're avoiding a certain amount of open burning in that first year, which produces some amount of methane or reduced carbon in addition to oxidized. So you get a benefit there.

And then you're also avoiding emissions that occur over a long period of time from buried biomass. And so that's still emitting out over the course of time for that fuel if you didn't use the fuel in 2006. And plus, by using a certain amount of forestry fuels, we did in 2006, again we took carbon out of the forest and burned it immediately. But over the long term, those forests, so treated, will actually hold more carbon on a long-term sustainable basis because we improved the forest. We've improved its growth rate. And we've made it resilient to those fire and other pest-type attacks that eventually really remove a lot of carbon from the forest.

So we get benefits in terms of the biogenic carbon shown in the green that are, over the long haul, more or less comparable in quantity to the benefits of avoiding a fossil fuel.

Recall whatever benefits might be quantifiable and usable in terms of avoided fossil fuel, that's part of the REC. But whatever benefits we may generate as a result of better disposal of biomass, those benefits are potentially available to the generator or to somebody in the biomass chain.

We hope that we can make actual real offsets from those net reductions in biogenic greenhouse gas because, quite frankly, biomass is not the cheapest renewable energy source. And if anything, it won't get built even if we do increase our renewables overall. It'll be mostly wind, a lot of solar going on right, geothermal.

But in order to get biomass into that mix, we need something in addition to the energy market, itself. And I think that the future may be in offsets. I'm hopeful.

This shows some of the different profiles you get by avoiding different kinds of alternative disposals. I won't spend a lot of time on that.

In any case, by avoiding fossil fuel use in the California energy mix of baseload power generators, you avoid about .8 tons of CO2 per megawatt hour, and you avoid, with the California biomass fuel mix, about .81 tons of biogenic net emissions.

So, hopefully we can make that happen. And this is what's happened over time. The operations of the biomass industry in California from 1980 to -- it actually ought to say 2006 -- that's a mistake I seem to make repeatedly now. I'm stuck in the 80s. I won't say how old I am. Somebody asked me what year my Prius was from recently. I said, oh, it's an 85.

(Laughter.)

DR. MORRIS: The guy says, they were making Priuses back then. I said, oh, sure. Oh, well.

But over time we've avoided some 70 million tons of fossil CO2 emissions as a result of the operation of the California biomass industry. And we'll actually peak out for what was already done as of 2006. We will peak out at close to 80,000 -- 80 million tons of biogenic emissions avoided. So that's a pretty significant accomplishment.

So where is the industry today? Well, we have an executive order, not the one on greenhouse gases, but an executive order on biomass specifically, which says that biomass should remain 20 percent of the renewables in the renewable portfolio standard.

And it says a lot of things about other parts of the biomass picture, too, including fuels. But just focusing on the electricity, that number was picked because that's where we were. In fact, that's where we are as long as renewables in general aren't really changing much in terms of growth. Therefore, biomass is retaining its share.

But when you look at what are the new projects signed up for development, you will see virtually no new biomass, and very little landfill gas. And so if the other renewables grow, then the share of biomass will shrink unless we do something to change that.

We have biomass plants throughout the state. We actually built over 60 since let's say about 1980 when the modern industry was launched. We've had a bunch shut down. We've even had a few move. Those are shown as dismantled, and the new facilities. But we've got about 31 operating right now. It's about 650 operating megawatts.

We've had some new facilities reopen since the RPS went into effect. But almost all of that new, and that's shown by the little red bars on the far right, almost all of the new biomass capacity shown there is, in fact, reopening facilities that were shut down in the mid-90s. It's not brand new facilities being built.

There's only one brand new biomass facility under development in California today. It's a 10 megawatt facility. And associated with a saw mill, and with a contract from a municipal utility. The munis seem to be a much easier partner to renewable projects, or all projects in general, than the IOUs.

We've seen fuel prices going up in the state as we pushed to produce more renewable electricity. And this gives you an idea that the fuel prices in northern California have been much higher than they have been in the south since the mid-90s. And that's really a result that we have much more competition for the fuel in the north, plus it's a more expensive source to fuel, in general, because a lot of it's forest-based.

We started out an industry that was primarily based on saw milling residues. The saw milling residue contribution has been going down drastically since about 1990. And the reason is really very simple. It's not that saw mill residues are a bad fuel. We're using virtually all of the otherwise unused saw mill residues. The saw mill industry has virtually shrunk since 1990.

A lot of the fuel that's been used to make up for the loss of saw milling residues has been urban residues, or fuel that's been kept out of landfills. Part of the reason for that, or a good part of the reason for that is that we have a solid waste diversion law, which pushes material out of the landfills. And that has actually worked to some degree.

These are the prices of different forms of biomass. You can see that the forest residues are certainly the most expensive. And I'm trying to rush through here a little bit. But hopefully we will make this material available in publication soon.

Obviously electricity production and fuel use sort of tracks, over time. We've seen the amount of behind-the-meter electric production from the combined heat and powers decline over time. Again, that's because we've lost the Diamond Walnut, we've lost a couple of saw mill generators. And that's just a consequence of that.

We had this very interesting California biomass fuel supply curve that made a major transition between about 96 and 97. Why that is, I'm still trying to figure out. I think I might have some feel for it. I think, in fact, that the solid waste diversion law has a lot to do with that. That law required a diversion level that was quite significant in the year 2000. And it was passed in 1990, so all the jurisdictions had that much time to make that transition. But I can't say that accounts for the whole change.

We have a very different supply curve in northern California than we do in southern California. And I can't tell you why that curve is actually sloping downward. But hopefully some day I'll learn a little more about that.

We see that, you know, the main variable in terms of cost of biomass energy production is the fuel cost; the costs of labor and capital is much more predictable.

And, of course, some of the facilities are on fixed price contracts, but many of the facilities earn variable, or monthly changeable short-run avoided costs. And you can see that the two solid lines there, the fuel price and the industry average electric revenue don't track that well.

And, in fact, right now we're seeing across the board a huge decrease in revenues being paid because of the collapse of the natural gas market. And this is not dramatic, because many of the biomass people are getting fixed price energy. So only some of them are seeing the revenues drop right now. But for those that are seeing that drop, that's very significant.

And frankly, the likely spillover into future procurement of renewables in general is very much at risk right now. And I've heard far too few people talking about this. But we're gearing up for a major solicitation of renewable energy in 2009, as we've done the past few years.

But the price benchmark which determines how much the utilities can pay for renewables is likely to drop by as much as 4 cents a kilowatt hour, which is, you know, 33 percent or 40 percent. And that could just make 2009 solicitation a complete failure. We'll find out. I hope that's not true.

But we've got to face the fact that what we thought was a stable benchmark for the past few years is not as table benchmark. Natural gas prices have made a huge move downward, and don't show any sign of recovery. And if that's the case we'd better watch out, or renewables are really going to be in trouble.

And that brings me back to the original

topic which was carbon tax versus cap-and-trade. what does it all mean. Because we are moving to a regulatory environment for greenhouse gases. No question about.

Well, as the good academic economist that I'm not really, I can tell you that, in fact, theoretically if you do both systems absolutely well, they're more or less equivalent. It doesn't really matter that much which one we choose. Although our chances to do either one that well is questionable.

Carbon tax sets a price, and then hopes that quantity will respond. Whereas cap-and-trade sets a quantity and expects the price to respond. But there's no way we're going to institute either system without putting checks on the other side of the equation. So right there you already begin to handicap their ability to function.

Now, there's no question that the carbon tax is simpler. Just a matter of taxing the three big fossil fuels at their source. And, of course, all signs points to our implementation of the cap-and-trade system.

Either could work for biomass. In some ways it might be easier to make biomass work within the context of the cap-and-trade system, even though the cap-and-trade system, itself, is so much more complicated than a carbon tax.

But I will leave you with that, and thank you very much.

(Applause.)

DR. KAFFKA: Comments and questions?

MR. IYER: My name is Rahul Iyer from Primafuel. We're a biofuels technology and infrastructure company. But we see the world of biofuels fairly broadly, not just transportation fuels, but for power generation, as well.

One of the technologies that we're commercially demonstrating in Sweden right now with Europe's largest pipeline operator, leverages the fact that biomass is quite uniquely a dispatchable type of renewable power in contrast to the wind and solar that you mentioned earlier.

To what degree does the regulatory framework in California currently support using biomass for higher value applications like peaker plants versus not? I know the answer, but I would like your comments on it.

DR. MORRIS: Well, I believe that there were two 50 megawatt biodiesel plants bid into

PG&E and accepted some years ago. And I have no idea what ever happened to those contracts.

Other than that I'm not aware of anybody actually bidding in a dispatchable plant. Now, biomass, as a solid fuel, can also follow the load, but not as quickly, of course, as a liquid fuel.

But the broader question, do we reward a either dispatchable or at least dependable source, and the answer is, that the utilities would give you is, oh, of course we do. We have this thing called least-cost/best-fit, where we rank all the projects that bid into a solicitation.

Well, least-cost/best-fit is a wonderful black box that those of us in the public can't see into. And so we don't really know what goes on in there.

But if there's much in the best-fit side of that, I'd be surprised. It really looks like it's completely least cost. That there's no real substance given to that dependability. And that's a shame because the utilities who do that also complain constantly about intermittent renewables. But they won't pay a dime to, you know, look at more dependable source. At least not yet.

DR. KAFFKA: Comment over there?

DR. BRAINARD: So this is a question. You know, most of the biomass that's around today is, indeed, in equilibrium with atmospheric CO_2. Some of the advanced biofuels using algae may, in fact, utilize fossil fuel capture and sequestration.

How do you think that will play out in terms of how will that count for greenhouse gas reductions?

DR. MORRIS: Well, you know, on an overall basis we have to establish the fact that there can be offsets on the basis of biogenic carbon, whether it be sequestered, whether it be reduced, you know, or shifted from methane to CO_2 or whatever.

So, the first step is we have to establish the fact that we can make offsets from biogenic carbon emission reductions. Once we've established that we can certainly look at each different technology or project or whatever and determine what that actual project is doing.

And if it's making a net reduction that is, you know, it's got to be verifiable and additional and all the other qualifications, it ought to be countable.

And so I'm hopeful that that'll be done. And if you're doing some sequestration, then you ought to be able to get credit for that, absolutely.

But we first have to establish that there will be any kind of offsets even available theoretically. And that's the battle that we have to engage in over the next three years, very very important.

MR. SHAFFER: Hi, Gregg. Steve Shaffer. I should know this and I don't. Under the RPS in California what's the teeth -- are there teeth in the regulations if the IOUs do not meet the 20 percent goal?

DR. MORRIS: Good question. And we don't know the answer to that yet. The regulatory structure says that the IOUs will be fined 5 cents a kilowatt hour up to $25 million a year per IOU if they don't meet their annual procurement target.

But we also have a flexible compliance regime which says that you can transfer energy you procure up to three years in the future back to the present in order to make up the deficit.

And so in the last two years all of the IOUs have been in deficit for the actual operating year. But we haven't gotten to the point where their ability to use up their flexible compliance options has happened.

It is in another year or two where it will finally be put to the test. And then we'll find out if, in fact, the CPUC will enforce. And if they don't, we won't have an RPS.

MR. SHAFFER: And is there a time value component then to those three years. Like in the low carbon fuel standard that was one of the debates because if indirect land use change is real, there's that giant puff at the beginning. And there was a whole analysis of the time value of that.

So is there any sort of time value component in that three years to borrow from the future?

DR. MORRIS: No, not at all.

MR. SHAFFER: Okay.

DR. MORRIS: Not at all.

MR. SHAFFER: Interesting.

DR. MORRIS: Yeah, and originally it was supposed to be that you had to produce a surplus in one of those subsequent three years, and the surplus could be brought back. But they've already gone and said that you could actually earmark and pull out even if it's not in surplus.

So it's sort of starting to look like a roll-over for three years. But even with a three-year roll-over it still doesn't look like they're going to make the target, so.

MR. SHAFFER: Thank you.

DR. KAFFKA: Two quick --

MR. SKYE: Coby Skye with L.A. County. I have two questions. The first is can you talk about why there was a decrease since 2004 in the amount of, or percent of renewables.

The second is you talked about that market price referent. And it's bad enough that decreasing fuel prices are making it very challenging. We heard discussion about that from Bluefire.

But for the regulatory perspective to again tie into fossil fuels as a basis for the prices seems to be a double whammy. Is there any discussion in moving away from natural gas as the price referent?

DR. MORRIS: Okay. Well, there are two

different questions there. In terms of the second question, unfortunately the MPR is actually statutorily embedded right now. But there's a bunch of RPS reform language going through the legislative, and there is an effort on some parties' parts to get rid of any benchmark and just use the old, you know, fair and reasonable standard that we use for conventional energy sources. That's the position I favor. And I will never predict what the legislature would do. So, we'll find out.

And your other question was? Oh, why has it actually decreased in terms of total percentage. Well, basically two reasons. One, we've seen an increase in total electricity use. And we have seen a very modest amount of new renewables be put online since that portfolio standard went into effect.

And the fact is that the total rate of increase in load has exceeded the rate of increase in renewable generating capacity. And recall that a lot of the existing generating capacity, including biomass, was built during the 80s. And it's old.

And, for example, we've had a couple

biomass plants that have blown up their turbine and had to go offline for sometimes eight months, something like that.

So, you know, they can't totally depend on that old infrastructure. It has its faults. And I think we've opened up something like 800 megawatts of wind, and that's about it, since 03. So we're not keeping up.

DR. KAFFKA: Last comment.

MS. NYOKKA: Just in the not keeping up factor I heard you say during your lecture how you lost the walnuts, you know, and that was a significant reduction in your biomass generating capacity.

And then also that you were cleaning forests and creating energy from that. But that maybe once you'd done your offering of cleaning the forest where else were you going to get your biomass, you know. If the mills are going down, if they aren't operating.

How well situated are you to go into, you know, like the excess rice straw and start using that for your biomass generating?

DR. MORRIS: Yeah. Well, we've lost a number of facilities just because of basic operating economics. Diamond Walnut in the past few years, but the big almond CHP. What was it called? I forget the -- right in Sacramento. That shut down about what, five or ten years ago. So, we've seen sawmill power plants shut down.

So, you know, it's not because of the biomass facility, itself. It's because of the facility that the biomass facility is serving in those cases.

In terms of where are we going to get the forest fuels from, we have so many acres of overgrown, really bad forests in bad condition in this state, which is why, of course, we see these huge, out-of-control wildfires increasingly plaguing our state.

It's a combined issue. It's not enough forest management. Obviously the drought affects it in a very negative way. Climate change is only increasing the fire season. I mean the Governor's declared that it's virtually a all-year phenomenon now. I mean we're having major wildfires in May right now, so that's not what we should be seeing.

So, across the board we have just a tremendous acreage of forests that need thinning. We're not going to run out of that need any time soon based on what we're doing today, which is just a tiny fraction of the need.

And a lot of that need is in our national forest lands. Approximately half of California's forests are federally owned. And, in general, those acres are in much worse shape than the privately owned and the little bit of state owned.

So, until we can the U.S. Forest Service working to improve their own forest lands, and this is hugely difficult and controversial. And you have a lot of environmental groups that don't want to see any forestry where they think the thinning is a cover for pulling out sawlogs and so on and so forth.

Until we can figure out a way where good forestry can be practiced on the national forest lands, we're not going to see those lands improve the way that the state really needs them to in order to deal with our fire problems.

Which is also, of course, a greenhouse gas-related phenomenon.

DR. KAFFKA: Thank you very much, Gregg.

(Applause.)

DR. KAFFKA: We're lucky to have Gregg

on our board. Now, as we go along in conferences like this you have to make decisions about how to manage time. And I want very much this conference to be of use to those of you who have attended.

So I've made a decision. We're going to probably go to lunch late. But we don't have a lunch speaker, so I think we can manage that. So I just wanted to alert you that we'll try to get back more or less on time, but that we'll have a little bit shorter lunch period.

Our next speaker is Chris Clavin. Is Chris here? Oh, yes, there you are; hi, Chris. He's an energy and environmental analyst with TSS Consultants. One of the folks from TSS is on our board, Fred Tornatore.

Mr. Clavin has been involved professionally supporting the development of biomass and biofuel-to-renewable energy through his experience providing environmental impact assessment, lifecycle assessment and regulatory compliance services.

He's an engineer and he advises clients of sustainable civil engineering design and master planning of large-scale infrastructure. Involved with the LEED program on building energy credits.

And, well, actually there's quite a large number of experiences -- in the interests of time we'll cut it short.

Thanks very much, Chris.

MR. CLAVIN: Thank you, Steve. Thanks, everyone, for being here this morning. And especially thank you, Dr. Morris, for going before me. You're really laying out the foundation for what I'm trying to discuss here.

The topic we're going to be covering right now is biomass energy's incentives. Some incentives for what we were trying to discuss before, how do we achieve a lot of the goals that were just discussed in the previous presentation.

And yesterday, as well, too. Particularly market based mechanisms. So, when I first read the topic, market based mechanisms, I thought, that's it, cap-and-trade. We're done. The solution there. We're 100 percent of the way there. Everything's solved.

That's not how things work now, really. Cap-and-trade doesn't really do much. It's not even there right now for us. And so the incentives that are market based across a broad scale.

So, first I'd like everyone to wake up. We're going to have a little quiz. I have seen the show on YouTube. I wasn't alive then, sorry.

How do we value externalities associated with biomass use and bioenergy generation? This is a really tough concept to wrap your mind around. There are so many externalities as we've been discussing.

From a broad scale we're talking water, watershed health, forest health, carbon, community outreach and job creation. I mean these are all externalities that are positive and negative that can be brought into biomass use.

And so to simplify this I like to allude back to a situation which some of you may have had previously in your younger days. Imagine this younger brother who likes to rock out on his electric guitar all night long, keeps you awake all the time, and you just can't get that kid to shut up.

What you do, so you have a couple options. Or at least I have four options for us. Maybe you have another one that I can add to my list, as well, too.

So, first, if you have a bunch of money

you could hand him a $20 bill and say, go out and buy yourself the best soundproofing you can. Go out and get the quietest amp you can. And maybe you'll be a little bit quieter. Maybe that sounds familiar to some of you, to build projects, as well, too.

Secondly, you can give them a little bit of money every time they give you a quiet minute. That sounds a lot like some federal incentives that we have to get our work done, as well, too.

Thirdly, a lot like the state of California, you can tell them they're going to be quiet 20 percent of the time, and live with the other 80 percent. And in ten years you tell them they'd better be quiet 33 percent of the time or you're going to give them a nice swift kick in the butt. Which is yet to be seen how hard that kick is going to be.

And fourthly, which probably is one of the strongest market based incentives, you give the entire neighborhood 100 kid hours of noisy time and you let them fight it out. Who's going to be the biggest payer and what this kid hour noisy time is going to be worth.

So, this is just simplified to get your

minds working in the way of -- to come back to this question as we go through the different incentives. This is what we're trying to do with the market based incentives. This is why we have this incentive structure.

So, taking a step back, the best way to use incentives is to manage the risks involved with biomass energy planning and development. Specifically, two of the largest risks that in the planning process, specifically deal with the fuel feedstock, price risk and the regulatory risk.

Yesterday we heard a lot about the regulatory risk and some of the things that can go wrong in the regulatory process and how long that can take. There's a lot of opportunity there to reduce the risks that are involved with biomass energy planning.

And secondly, I want to focus on this one a little more, is the fuel feedstock price risk. Planning a large project, currently woody biomass is going in the range -- Dr. Morris hade a great slide previously -- around the $22 to $60 range. $22 maybe around there, the low end, if you have a low quality fuel or a long-term contract. Or $60 and above if you're talking about a high-grade fuel, and possibly -- a high-grade fuel or possibly if you're trucking it in from some really deep locations in forests or from outside the normal procurement area that you're normally working in.

So, when I look at how are we going to internalize these externalities, fuel is where the rubber meets the road. That's where many of these externalities occur. And fuel provides us, this risk and this risk mitigation that we can use through policy and regulatory incentive mechanisms provide us a way to potentially attack those externalities.

So, I like to pose that we have an incentive framework and tools currently in the state of California and for biomass energy in the state. And particularly I'd like to put that into four categories.

So, first of all, you have direct incentives, particularly federal and state grants. Local grants would go into that, as well, too.

Secondly would be credits, particularly tax credits, to get things moving. They're not a lump sum payment but they definitely bring down the overall operating cost and amortized cost of a facility.

Thirdly I would say the indirect incentives, particularly dealing with the ag and forestry sectors. Those definitely deal with the fuel. That includes command and control mechanisms, particularly mechanisms like the renewable portfolio standard, as well, too.

They don't directly affect biomass energy and say you have to do this with biomass, but they affect the industry as a whole.

And fourthly, the market-based and permanent incentives, which currently are being developed, but aren't necessarily there yet.

So, the first incentive, and particularly grants, this is the big dog in the room when you're talking dollars and cents. Right now the Stimulus Act of 2009, instead of taking the production tax credit -- and this is for all biomass projects and renewable energy products mostly, as a whole -- instead of taking the production tax credit or the investment tax credit, a grant can be taken in lieu of those tax credits. It's a significant portion of the capital costs. It provides you a grant of up to 30 percent of a qualifying facility. That's big money right there.

And I like to point particularly, if you're interested in learning about more how this option affects different facilities and their potential development, there was a report that I was reading from.

It was a joint report between Lawrence Berkeley Labs and NREL. That was released in March of 09. That looks at all different types of renewable energy facilities. And based on their capacity factor, their operating factor. And the rate of return they're looking for. Which way is the best way to go. Is it better to take the production tax credit, or is it better to take the grant.

In California most of the facilities really have a traditional biomass or open-loop biomass. And in that case the grant is always the best way to go, based on their analysis.

So, a little more about direct incentives. Particularly I'd like to talk a little more about federal and look at Oregon's incentives, as well, too. Doesn't mean it's a comparisons for California.

Federally, as I mentioned, we have the

production tax credit and the investment tax credit. Actually, before I go into that I'd like to step back a second.

The stimulus act, as we've all heard in the news, it's about shovel-ready projects. It's about getting people into jobs. And so, currently, as it's written in law, the facility to be qualifying for that grant, has to be in construction by this year or next year. So, you're talking really shovel-ready projects. They have to be ready to move fast. And it has to be in service by 2013.

The production tax credit and the investment tax credit has been extended out much farther than that. And those are constantly leveling the playing field, particularly in California.

California has some of the direct incentives, particularly the Energy Commission's existing renewable facility program that's Jason Orta and his team's program out there.

It's my understanding it's a case-by-case evaluation which provides a direct incentive to developing traditional biomass facilities. And I would defer to him and his team to get the details of what the case-by-case evaluation is, and how they internalize the externalities that they're considering.

And when we're going back to the regulatory risk, executive order S-1408, which was signed last November by Governor Schwarzenegger -- it's actually supposed to say one-stop process permitting needs. It creates an agreement, essentially MOUs signed between the Energy Commission and the California Fish and Game to essentially the goal is to cut the permitting times between those two entities in half.

Currently there's MOUs, I know, signed between the Fish and Game, Energy Commission, but also with BLM and U.S. Fish and Wildlife, as well, too. So the MOUs are there, but it's yet to be seen what that does in terms of managing some of that regulatory risk.

Particularly I'd like to -- I was hearing a lot of the comments from yesterday. And I'd like to take that out a little farther in terms of getting a lot of the small-scale facilities.

Biomass, by and large, is not the big 50-, 100 megawatt facilities. It's the small ones. Particularly any of the new facilities coming into California. They're around 20 megawatts in size.

They have to be appropriately scaled economically, particularly based on the fuel feedstock. And a lot of the regulatory process deals with local coordination, particularly land use.

And the executive order does not say anything about local coordination. And so that's one piece that has yet to be filled. And there's a void there where some of that regulatory risk can be mitigated to incentivize the biomass energy generation.

Oregon has a very interesting incentive process, and particularly with regards to direct incentives. They offer a business energy tax credit of up to 35 percent of project costs, split over the first five years of operation of the facility. That's also a big number.

With high efficiency CHP facilities, they offer up to 50 percent tax credit of qualifying facilities and qualifying costs. And I say qualifying costs, I mean all capital expenditures. Your initial permitting, your engineering design, construction, all that.

It's a little bit different playing field between here and Oregon. And it's also interesting to note, too, that many of the facilities in Oregon, as well, too, pretty much primarily co-located with saw mills.

So that's a little bit different from California. Many of the California facilities are co-located, as well, too. But due to the central valley, due to the central valley and the large population centers out here, we see facilities, as well, too, that are mainly relying upon urban wood waste, forest residuals and ag waste, as well, too.

So there's some indirect incentives that we're looking at. And these also have a direct effect on what the market it. It would be the RPS, which is both in California and Oregon. Oregon's a little bit different in that in 2020 they're slated to go to 25 percent.

California there is significant local and state grant programs for fuels treatment. Programs in state and private forest lands. In 2003 Senate Bill 705 was put into law which prohibited open burning of ag waste, which was a big boon for biomass facility siting in the central valley.

Oregon has a real interesting tax credit program where they credit, at least for woody biomass, and they do this for ag waste, as well, too, and green waste. The green waste is slightly lower, however.

They give a tax credit of $10 a green ton. And going back to some of the first slide and some of the points I made there, they're attacking right where the rubber meets the road. They're attacking fuel costs. And that really does a lot in terms of expanding the fuel procurement area, increasing the acres that can be potentially be treated, really opening up the boundaries for bringing in and getting under control some of these environmental externalities that we're attempting to grasp.

I guess just to give a sense, so that's about $5 a bone dry ton, which if fuel's being procured right now, it would average $35, -- $30 to $40 a bone dry ton. That's over 10 percent of the fuel cost. That's still, that's pretty big, as well, too.

So, market-based mechanisms incentives,

what I'm here to talk about. This is slightly a misnomer, as all the things we've been talking about have been market-based mechanisms and incentives, as well, too.

And so there's four ways that, if you're talking public policy 101, I would describe market-based mechanisms, one would be a pollution charge when you're talking about environmental market-based mechanisms, one would be a pollution charge.

Two would be tradeable permits which we'll discuss a little bit. Three would be market barrier reductions, i.e., market creation liability considerations, so having private entities internalize environmental liabilities. And information dispersals, clearinghouses, for example, market data. Which the Collaborative is part of, as well, too.

And the fourth one I would categorize is government subsidy, or subsidy reductions. So these all fall into this. But particularly next we'll talk about the tradeable permit programs.

So I would say there's two major categories right now that are currently active that affect biomass energy facilities the most.

One would be the new source review process, which is supposed to be a tradeable permit program. Although it's highly questionable at how much of an active market it is in a lot of the air districts. Particularly NOx credits. They're not necessarily available, or they're not necessarily available even for trading.

And even if someone were to have all the money in the world and all the cash to throw at it, they just wouldn't be able to procure it. Southern California is a very good example of that, in particular.

And secondly, would be the carbon markets, greenhouse gas markets. Voluntary carbon markets are the most active right now, as in California there is no mandatory carbon and greenhouse gas market, which should be coming with AB-32. It's yet to be seen what that impact will have on biomass energy.

It won't have a direct effect as Dr. Morris was talking about, particularly, as biomass energy is under the RPS, and thus won't be eligible for offsets, nor will it be capped, because it's a renewable energy. Or if it gets qualified as a renewable fuel.

And voluntary carbon and greenhouse gas markets mostly take into account the forestry sectors. So when you're talking about where are these tradeable permit markets actually going to take an effect, it's with the interphases of biomass energy. It's the ag lands; it's the land use issues; it's the forestry, forest health issues.

So, currently, the four biggies in terms of the four big carbon registries, are the Voluntary Carbon Standard, Chicago Climate Exchange, Climate Action Reserve, a spinoff of C-CAR, and the Climate Registry.

All, to some degree, have their own protocols for forestry projects, which probably, in California, have the most impact on the biomass energy sector.

But thinking back to our initial question, what is additionally in the forest sector, and then how does that go back to internalizing these externalities for biomass energy. That's yet to be seen, as well, too.

It's not a direct correlation, but it's something to be considered as we move forward with the cap-and-trade mechanism. How is that going to affect the issues we're most concerned about when dealing with these externalities.

So, a couple of facilities to highlight the points that we've been discussing. One, this is in our neighbor's backyard, Buena Vista Biomass. This is currently going on right now. This is an HN half-megawatt repowered facility.

This is pretty common of what you would see right now in California for new, rather not new facility, but repowering. If you're going to see a biomass power plant come online in California, this is pretty typical. It's based out of Ione, Amador County. And the fuel feedstocks are pretty standard for what you might find in a facility in that area.

They have the opportunity of being a repower that they're eligible for many of the incentives. And so that is particularly one reason you see them coming online now, in the timeframe they're looking at, in the next couple years. And it provides an interesting case study in looking at how they're attempting to utilize these incentives by selling themselves as a steward for the different environmental issues that we're attempting to capture.

And then not to beat a dead horse here, but Placer County, I think they have a very very interesting program. And Tom Christofk, the Placer County APCD, -- the APCO, yesterday spoke about his program and his county's program.

Particularly I think it's a model of innovation, business innovation; and also regulatory innovation. Their goals over there with developing a facility with looking at their accounting process of utilizing ecosystems valuation is an interesting business model.

They are working with private entities up there. But they're a public agency, and so they also have an interesting public/private partnership model that could be potentially used, as well, too, in the future for biomass energy.

And one thing that they're using up there is -- this is the second bullet -- I see them as using broad-scoped initiatives, or broad-scope incentive models that really highlight the interfaces. They're looking at the interfaces, they're looking at the links. And those are the best places to tackle and pull in these externalities.

So, a couple of thoughts and questions I still have, after studying this information. There's a wide range of incentives in California stimulating growth, biomass energy growth. They're different from other states. And California's market is definitely different from other states, as well, too.

I presented some of those tax credits from Oregon, but Oregon does not have nearly the ag land, the amount of ag land that we have out here. So, they're completely different issues and different ways to attack them.

And the second line should actually more read do current market-based incentives particularly permit tradeable permit incentives, appropriately value and internalize the externalities that we want to value.

Particularly, does only looking at this trading in the units of CO_2 and renewable energy credits actually acknowledge those. Yet to be seen, but to be part of the discussion.

And lastly, are those market-based mechanisms the best way to valuate. I'm not sure yet, personally. And it should be definitely on the discussion table when trying to look at ecosystem services, ecosystem values.

Thank you.

(Applause.)

DR. KAFFKA: Any questions or comments? No, I don't think so.

MR. CLAVIN: Okay, good.

DR. KAFFKA: Okay. Our last talk before the break is by Dr. Giorgio Zoia. And Dr. Zoia works for British Petroleum, BP. He's had more than 20 years of experience in the energy sector. He's led business developments and entrepreneurial ventures developing new markets for innovative products, policy and external relation initiatives related to the advancement of new technologies in the green energy sector. Including working with the U.S. Department of Energy and various California agencies.

He has degrees in chemical engineering and material science, the last from the University of Milan and an MBA from the University of Chicago.

He's going to be talking to us about a very innovative energy project that is in the planning stages, I think, now. Thank you.

DR. ZOIA: Thank you very much. So, I work for BP, which is a big energy company. And I thought it would be interesting to give a little bit of the perspective of what we are doing in the field of carbon capture, and with a little bit of perspective from the biomass point of view.

BP has different departments. And actually there is a large effort in biofuels and for fuels for transportation. And actually I'm not going to talk about that.

What I'm going to discuss is this effort here in California and in other parts of the world. It is through a joint venture that BP started in 2007 between BP alternative energy and Rio Tinto.

Rio Tinto is a large mining company. And they have a significant interest of reducing the carbon impact of the coal that they produce.

So, what we tried to do is have the production of fuels with a lower carbon impact. So we call them low carbon fuels.

And how does it work? We would start from traditional fossil fuels like pet coke and gas or coal, and I'll tell a little bit more about the situation in California. And possibly biomass. And we go through a gasification process.

And the gasification process is in two steps. In the first step you go from carbon to CO and hydrogen. And then you put more water, and you shift to CO_2 and hydrogen.

And at that point it's possible to separate the CO_2 and compress it, and send it to storage, geological storage. The hydrogen then is low carbon because most of the CO_2 that was produced in -- to produce hydrogen has been captured. And then can be used for a number of usages.

The simplest one, which is what we are trying to do now, is to produce electricity. But, again, given the value of hydrogen, itself, there are other usages like in -- production or in transportation that can be of higher interest.

I'm sure that you have heard about carbon capture and storage. There is a effort, a federal effort to try to start some of these facilities. One is called FutureGen, I think, in Illinois. And many people say, well, it is nice, but it is actually technology that has not been proven, and it is not there.

And I like to challenge that a little bit. It is true that there are no big facilities that at this point produce green electricity and low carbon electricity, and have carbon capture and storage. But all the components of those plants are operating in other applications.

So, the gasification part is used in biomass, too, I think. But initially for fossil fuels in a number of applications. And the storage part has been proven. And there are actually more facilities that have shown how it can work.

The other thing is CO_2 is widely used actually, especially in the U.S. in Texas for enhanced oil recovery. So, basically the CO_2 is pumped into the oil field to recover more of the crude oil that is available there. And it can be permanently stored there.

And, you know, as gas and oil has been basically stored there for millions of years, so the CO_2 will stay there for a long time. And actually with time it will also react with some of the formations there. So to become basically part of the solids.

So in order to develop this projects there are basically three major things that have to be there to have an economic project. One is the market for that wants the products that we would produce. And that is pretty do-able; it is electricity or hydrogen.

The second thing is to have the right geological formations, where to store CO_2. And as I said, the best one at this point is with the depleted oil fields where CO_2 can be used to recover more oil. Or in solid formations where it can actually be stored permanently.

The third thing is more of a political or market condition, which is very simple. This process is more complicated than just using fossil fuels to produce electricity. So the resulting electricity or hydrogen are more expensive than the market, the current market prices.

So there is a need of either some incentives from the local authorities to sustain these projects. Or some mechanism like carbon tax or cap-and-trade that make other products that do not capture CO_2 more expensive. So, you need these mechanism to allow these projects to go ahead.

So, at this point we have found a couple of places where we are in advanced stages of developing such facilities. One, which I will not go into many details, is in the Middle East. Basically there is a need to use some of the natural gas there instead of they use the natural gas to pump it back to the oil fields to push out the crude.

So there is a desire to use that gas for other usages. And so the CO_2 that this produces that use this natural gas to produce oil. And the electricity is used for consumption locally.

This, as I said, stems from natural gas. So it is a little bit different. (inaudible) starts from a relatively low or lower carbon fuel than coal or other higher carbon fuels.

The one I wanted to give you a little bit more details is actually in California. We are working towards this project. It is going to be near Bakersfield. And the reason for that location is because originally actually it was supposed to be in Carson, which is in Los Angeles.

But the oil field operators expressed a stronger desire to use the CO_2 in the formations that they has in the vicinity of Bakersfield. And it became pretty clear that it was regular, and while not technically, but it would have been very difficult to build a CO_2 pipeline that would go from Los Angeles to Bakersfield. So we basically had to move the plant there.

The feedstock for this plant, which is what you might be interested, is going to be mainly pet coke. So what is pet coke? Pet coke is the final byproduct of the refining process. And so each, most of the refineries in the state produce some form of pet coke.

Some is higher grade so it is used for other applications. But a lot of it is lower grade pet coke. And whatever is right now, it is just shipped to Asia, Asian market. And it is burned there to produce electricity.

And basically the CO2 and the other pollutants that are produced there come back to California in the air.

So, there was a strong desire by the PUC to have at least some of this pet coke used locally in a way that would not produce greenhouse gases.

So basically this plant captured more than 90 percent of the CO2 that would be produced. And in the end, per megawatt produced it is more than two-thirds, I think, cleaner than an equivalent natural gas plant.

So, we wanted to try even to improve on that. So the idea, and here it catch the interest of coming here, was to see if it was possible to use some biomass.

So if you use biomass in this type of configuration, that the CO2 is captured permanently, so there is actually for the carbon that comes from the biomass, a negative final, you know, lifecycle balance.

So, we can actually say that at least for the carbon that comes from the biomass, we are taking it out from the atmosphere and we are putting it into the ground.

Here are more details about the plant, itself. But basically it is a 250 megawatts. And if it uses 100 percent pet coke it's about 3000 tons of pet coke per day. So, I am trying to see if it is possible to use maybe 10 to 20 percent of that with biomass.

Now, the energy content of biomass is lower, depending on what type of biomass, than pet coke. So that would affect the availability and the final energy output. But the overall impact on the environment is actually very positive.

So I've looked at two different options, which are basically, one would be to mix the biomass with the main fuel and basically feed it to the main gasifier. And the other one would be to have a separate smaller gasifier dedicated to the biomass.

And, you know, in parallel with that I have been trying to identify what sources of biomass would be available to supply enough fuel at a not, you know, too expensive price for that particular site.

So, we are still in the planning process. And every suggestion is actually very welcome. And I think this is just repeating what I just said.

So, this is it. If you have any questions?

(Applause.)

DR. KAFFKA: Any questions or comments?

MR. BRENDEL: Hi, I'm Alex Brendel. I come from a scientific background, and I'm not entirely convinced that geological storage is permanent. I'm concerned that perhaps an earthquake, or that the CO2 put underground in pressure will bubble up sometime in the future.

So, could you do -- could you try to

convince me that it is safe and permanent, that the CO_2 pumped underground into these storage wells will stay there?

DR. ZOIA: It all depends on the timeframe that you're looking at. If you ask me 10 million years --

MR. BRENDEL: I'm talking about forever.

(Laughter.)

DR. ZOIA: Forever, you know, the earth will not be there. But, it is a controversy that is still there. And I'm not actually an expert on the sequestration of CO_2.

I think that so far there is good scientific evidence that it will stay there for a long time. Again, it depends what is a long time. If it indeed reacts with the formation, then if it becomes a solid, then a carbonate or, you know, other forms, it will actually be there forever.

One thing is that, you know, those formations, especially the ones with natural gas, have been there for millions of years, and the natural gas has not come out.

But, you know, there is always the thought about earthquakes and things like that. It is very deep, so, again, it gives some comfort.

But I guess the 100 percent, forever assurance, it's a little bit difficult to give.

DR. KAFFKA: I have a question. Steve Kaffka. Does the use of biomass provide, for instance, credits that might be useful as a bankable credit or saleable item to other utilities?

In your planning, does it -- is it accounted as a potential economic asset?

DR. ZOIA: No, we have not, actually. Not yet. We are -- the plant, in itself, cannot apply for a renewable standard because the electricity that is produced from pet coke is not renewable.

But, possibly the percentage of power that comes from the percentage of biomass feed would be part of the renewable portfolio.

But besides that, I have not looked at that --

MR. TOUCHTON: Hi, I'm George Touchton with Clean EnGen Group. I just wanted to say that, you know, you're way too modest. I think it's interesting that a coal guy had to come to this conference and talk about sequestration.

There are national efforts underway on

sequestration in the United States, regional efforts underway. Europe, Japan, China, Australia, I mean the list goes on and on.

Sequestration is a very large topic. And the realization that there needs to be scientific work done, and there's a great deal of scientific work being done to define the exact -- time for specific geologic formations, specifically saline aquifers, which are big in California.

And nothing is forever. I don't think forever is a scientific term. But I would agree that, you know, there are sequestration means which have, for all practical purposes, millions of years of possibility. Some with hundreds of thousands.

And so that I believe the biomass community should take a hard look at the advantages of sequestration.

Sorry, that was a comment and not a question. But, --

DR. ZOIA: He put it very well. And, again, as I said, I'm not -- I come from the upstream background, so I'm not an expert in sequestration.

But for sure it's very difficult to insure a human activity for millions of years. And so this looks like one of the most long-term insured nonconsequential activities that can be scientifically shown.

So, it gives a lot of concerns. But I think it has been proven in many ways.

MR. TOUCHTON: Pardon, if I could just add something informative to my tirade. If you go to, strangely enough, the DOE National Energy Technology Lab Site, that's usually where I go to their website, they will show you an interactive map of all of the potential sequestration sites, and their safe progress in the United States.

So you can very quickly learn a great deal about what is going on in sequestration in the U.S. and the world on that website.

DR. KAFFKA: Thank you. Thank you very much.

DR. ZOIA: Thank you.

(Applause.)

DR. KAFFKA: We'll take a 15-minute break, and by my watch start at 11:00 again. Thank you.

(Brief recess.)

DR. KAFFKA: Our next speaker is Harrison Pettit. A quick biography, he's the Director of Business Development at Pacific Ethanol, which is the largest, I think, ethanol producer, certainly in California, if not in the west coast.

And he's also the principal investigator for their cellulosic biorefinery project that's developing now in Oregon. So, we think that'll be the majority of what he talks about today.

He's helped develop, in fact, not just that project, but all of Pacific Ethanol's facilities and plants for ethanol and alternative fuel production for the west coast.

So we're very grateful to have him. He filled in a spot for us on late notice, and we're especially grateful for that. Thank you.

(Applause.)

MR. PETTIT: So for those of you coming in late, I am not Brook Colman. I am a shorter, older, balder guy than that. And I'm not going to hold him responsible for any of my comments. Though I know some of you from the Air Resources Board Staff, you'll be relieved to know that I'm not Brook Colman.

And my perspective on this topic will be a little bit different. I think Brook would have taken a broader survey of policy incentives vis-a-vis development of second generation fuels and energy.

I'm going to kind of give you a perspective from the trenches from a practitioner, and use the lens of our west coast biorefinery, which is a cellulosic demonstration scale project in Oregon. And kind of give you some background on that.

And also kind of give you the perspective of what policies have really represented tailwinds, and what have represented what conditions and policy incentives may have turned into headwinds.

But first I'm going to kind of break with tradition a little bit for these things and give you the key points upfront. Or at least a few of the key points that I'd love for you to take away from this 15 or 20 minutes. And I know you've been barraged with subjects. And if you're like me, some of them just fly by, and some you're like, wow, it was amazing and you grab hold of.

So, I'm going to keep these very simple.

And there will be some other points.

But three that I want you to really retain is number one, Pacific Ethanol is committed to leadership in second generation biofuels. So, we're the largest producer of corn ethanol in the western United States, but we are very very committed to a strategy in second generation.

And as a result, the west coast biorefinery is incredibly important to the company as a strategic direction.

Two, and as a corollary to that, corn ethanol production and the industry is a key foundation to getting cellulosic gallons to the market. And I say foundation because most people view it as a bridge or a gateway fuel. And it is those things, too. But, I really feel, and our industry feels, that it is upon the shoulders of conventional biofuels that second generations will come. And that's really the way we are viewing this. And I'll explain a little bit more about that.

And third, you know, good policy incentives are fantastic because the purpose is to reduce risk for bringing on experimental technologies. But obviously bad policy incentives are not incentives. They are, at best, confusing to the marketplace and send the wrong signals. And I think today we are experiencing some of both.

So let me give you a little bit of just an introduction to the west coast biorefinery. One of the significant aspects is that the site is at the site of our Oregon plant, which is Pacific Ethanol Columbia. That's a 40 million gallon a year corn ethanol plant that's located on the Columbia River at the Port of Morrow in Boardman, Oregon.

And so the purpose is to -- so this is not only the site, it is a plant that will be closely integrated with the existing starch facility.

Our technology partner, and I think if you look at our logo, this becomes even more significant. You'll see it's Pacific BioGasol, which is the subsidiary that is managing and driving this -- a wholly owned subsidiary of Pacific Ethanol, which is driving this development process.

But our technology partner is a Danish technology developer and engineering company called BioGasol. And their technology is, their sort of core proprietary expertise is around pretreatment, which is generally viewed as a wet explosion process. Whenever I say that with a straight face makes my 11-year-old burst out in laughter.

(Laughter.)

MR. PETTIT: I don't know what about wet explosion makes him laugh, but it does. And the second one is the fermentation of C5 sugars. They have a developed thermofile that they've been developing for about 15 years, which is highly innovative. And, again, their integrated process has been piloted for more than two years.

So we were very impressed with that and we formed an alliance which is, of course, critical to this project.

We're also working with our strategic partner of JBEI, which I think most of you are familiar with, that's in the Bay Area. It's, of course, a partnership of the national laboratories and UC Berkeley and UC Davis. And they're going to be performing some R&D work for us, primarily looking at optimization of our cocktails, and looking at an enzyme recovery system.

We're also going to be working with another acronym, a laboratory called BSEL, which is Bioproducts Science and Engineering Lab. This is less known. JBEI, of course, is DOE-funded. BSEL is a partnership between PNNL and WSU. And it's in Richland, Washington, which is within 30 miles of our project site.

And we're going to be working with BSEL primarily looking at the sort of raising the value of our coproduct, which in this case is lignin.

So the project cost is around $50 million. And just to be clear, this pays for everything, you know. So this is engineering, construction, equipment and two and a half, three years of operations. So this is the whole enchilada.

Our funding is from DOE. We were one of nine demonstration projects that were selected. And I'll talk a little bit more about that. So it's $24.3 million has been committed, or I should say with the DOE you are selected for the right to negotiate. And it's a multistage process and we're in the first part of that process right now.

The scale of the demonstration plant is 2.7 million gallons a year. And we're going to be using -- so this is probably 100, to 150 dry tons a day is the through-put.

We're going to be testing primarily three feedstocks, wheat straw, corn stover, and hybrid poplar residuals. And so we are planning to do some very long feedstock campaigns around each of those three over the course of about two and a half to three years. And again, if you ran them all together and assuming somewhat similar conversion rates, then you're looking at probably 40- to 50,000 metric dry tons a year in terms of scale.

So, to give you a context a little bit of geographic and visual context of where this project fits in in terms of what DOE has funded, and this has been alluded to yesterday. But the DOE has selected between 2007 and 2008 15 projects. Six were commercial scale.

And if you look at the greenish-blue, I should say the green stars on that maps, you will see that there are four remaining of those commercial plants, one of which is BlueFire, that we saw a presentation of yesterday. And the red stars are the nine one-tenth or demonstration scale projects of which Pacific Ethanol was selected as one of those last year.

And you can see that there really are only two projects of that kind on the west coast. So I think it's, in some ways, makes this even more significant. And ours is up in the Pacific Northwest there in the upper left-hand corner, as they say.

And I think it's important to look, you know, of those nine, eight are progressing. But I think slowly. Of the four commercials that are still around, there's a little bit of stopping and starting. So, I think it is cause for reflection to think that these projects, which have been effectively endorsed by experts in a merit review process for their likelihood of succeeding.

And, of course, there is a factor of geographic feedstock and technology diversification. But, they have been given a great technical endorsement. And they've also been provided with up to 50 percent of their funding. And yet still this process is moving, I think, very very slowly. So it's certainly a statement about the situation that we're in. Where we're excited, and there are a lot of incentives, and a lot of tailwinds. But there's also, in addition there's some headwinds, as well, that we're dealing with.

So what are the goals and objectives of the west coast biorefinery? It goes without saying that we want to design, construct and operate this 2.7 million gallon cellulosic ethanol plant. But we also want it to be an example of one that is integrated with an existing starch ethanol facility.

We want to demonstrate the viability, economic feasibility of Biogasol, proprietary cellulosic conversion process. Again, using multiple lignocellulosic feedstock. We want to show how robust and flexible it is.

But most importantly, we want to, by validating the metrics, by getting the operational data over continuous operations, we want to lower the technical risk for deploying this technology, and financing this technology, in two ways, which we find significant. Especially when we think about California.

One is really what we're calling, for lack of a better term, an add-on. So this is really this kind of smaller scale bolt-on, which is not unlike what we're developing right now. It could probably go up to 10 percent of the size of a corn ethanol plant.

But this is the idea that as a way to reduce risks associated with getting cellulosic ethanol gallons to the marketplace, you utilize the corn ethanol platform. Because, you know, we have plants at the Port of Stockton and Madera, California. These are fully permitted facilities. They have the infrastructure there. They have the off-take. They have the downstream distillation process there. There's a lot of avoided costs and avoided development aspects which make getting gallons to the marketplace quicker, and therefore reducing risk. Obviously reducing the capital.

We think that it's, and this is, of course, based just on estimates at this point, but we think that you could put a 4- to 5 million gallon bolt-on to one of our plants for, you know, $25- to $30 million. That's a lot different than a full-scale or 10-X commercial plant. And we think it could be done much quicker.

Now, we're certainly not precluding the 10-X or commercial scale plants. The 2.7 turn into 27, or 30 or 40. Obviously that's necessary. There's a lot of gallons that need to be produced.

But in terms of building, you know, sort of buying down the risk and building momentum towards this, toward getting real gallons in the marketplace, we think that these provide two important options.

And, of course, that doesn't mention just the feedstock aspect of supplying a large-scale commercial plant, and the reduced risk of supplying a smaller scale plant.

So, again, one of our chief goals there is to form the basis for design, construction and operation of the add-on and/or commercial scale facilities, beginning, we hope, I assume it's 2012 and 2013.

So, let's look at some of the policy aspects of this. What are the tailwinds? And most of you know all this stuff. But I'm going to repeat it anyway. And you're familiar with this stuff.

But, again, this is just our experience as a project. And, again, this is mostly about reducing the risk. And so, of course, we were fortunate enough to get a DOE grant. And not only was this $24.3 million, it was a validation of our technology and our platform and our program for execution.

And, of course, in the last week you've also seen an announcement even further dollars may be headed our way if those dollars are needed. And certainly encouragement for acceleration.

There's also the expanded RFS, which created the 36 billion gallon target. But for cellulosic biofuels there's specifically a 16 billion gallon target.

So this is, again, great; this is fantastic. There's money; there's validation of technology; there's a marketplace, a mandated marketplace. You can't ask for a lot more than that.

The farm bill has provisions. A producer tax credit, which nets out to about 55 cents per gallon. Again, this is fantastic for when you are producing and helping to ease those operating costs.

There's also 9003, which is primarily, at this point, in terms of what's obligated funds, USDA to provide load guarantees, but those are largely, I think, or exclusively for commercial scale projects and not demonstration scales.

Then we get into Oregon, which has done

a really terrific job. This is obviously one of the reasons we're there is they created their own renewable fuel standard. So, again, they were blending in the wintertime there, but now there's a 150 million gallon market because of the 10 percent mandate.

But in addition to creating that market, and by the way it hasn't occurred without some grumblings, if you guys are reading the press. But in addition to that there were provisions to promote second generation cellulosic biofuels.

There is a feedstock producer/collector tax credit of $10 a green ton for woody material and straw. There's $10 a wet ton for wastewater solids, and so on. $5 a green ton for yard waste and manure. So, again, they are again trying to, and I think doing an excellent job of providing the right incentives for development of this industry.

There's also the Oregon BETC, or the business energy tax credit, which for this project could provide $7- to $9 million in, you know, after construction tax credits. Again, that's fantastic.

There is talk of an Oregon low carbon

fuel standard, which is being proposed. Again, you know, there's -- I prefer at this point to think of it as good news. But we'll see how that legislation materializes.

And then just to get these types of incentives in Oregon passed, there had to have been the support from environmental and political groups that both helped to get this legislation and these policy initiatives passed. And also made siting and permitting a bearable process.

So, what about the headwinds that we are facing. There's sort of the good news, bad news. The good news about the DOE grant is they're going to give you 50 percent of your dollars. The bad news is you got to come up with the rest.

You know, I think had this been developed, you know, I think were the conditions we're in now like this earlier, things might have been different. But this exactly what has to happen. And that is it's a formidable challenge in this environment.

And the other stipulation, of course, is you can't get -- that cost share can't be derived from other federal sources. So there is no direct stimulus dollars that can be used for cost share.

So, again, thank you very much, but we still have a mountain to climb.

Then, of course, the corn ethanol market conditions are not exactly spilling profits out for internal capital investment. And that's not only for speculative experimental technologies, but for technologies to improve the efficiencies in carbon footprint of our plants.

So this is, you know, you have a correlation between corn and ethanol pricing that is essentially like a boot on your windpipe that is basically bleeding this industry. And, you know, you've got probably 20 percent of the capacity is now offline. Three out of our four plants are now offline because we can't afford to run them.

And what does that say. If you can't run a corn ethanol plant, how in the world are you going to afford to run cellulosic ethanol plant, where there are just lots of work to be done in terms of efficiencies. So, it's very daunting, but we have to persevere, of course.

Then the credit markets obviously add to that in terms of your ability to invest. And, again, part of what has to happen with corn ethanol is diversification, investment in technologies which improve efficiency and diversify your product mix.

We are extremely vulnerable to the fact that in the ethanol markets you have a diverse and fractured set of price takers, and a very concentrated and wily group of price makers on the purchase side.

And so no offense to our gentleman from BP, but it's a powerful group and they're having their way. So, that's tough.

And then there are policies, which, you know, you look at the low carbon fuel standard, indirect land use penalty. And with all the best intentions to create incentives, I think because there is a lot of controversy and uncertainty around the science of that, which really -- we've muddied the waters. And so uncertainty does not encourage investment. Uncertainty waits. Money's going to sit on the sidelines to see what is going to happen with this.

And, you know, we've entered a bit of a black hole. This is a very very deep cavern when you talk about indirect effects. So it's very very challenging. And I think it's really put the burden on -- unfairly on biofuels producers.

So it's like, you know, now, it's like okay, now you've got to prove to us. We are guilty and now you must prove your innocence. So, I think it is an issue that has to be addressed. But it's a very very challenging one.

Then we have other policies, which are there, and that need to be addressed. There is the blend wall issue. If we're going to get 36 billion gallons we need to raise the blend wall and/or accelerate the fleet conversion to FFVs. You know, those are very very critical policy challenges.

And then, of course, because of the controversies there are a lot of advocacy groups that are challenging project siting and permitting and other issues. So that makes those things -- I think people don't really understand how hard it is, and how hard it's going to be in this environment.

So, what are some of the conclusions and recommendations. I mean I sort of preloaded a few of the conclusions, but I want to add to that that we are very very encouraged by what we're hearing from the federal government. The support is strong; it's getting stronger.

The biofuels interagency working group that was formed is absolutely fantastic. Getting the USDA, DOE and EPA together to harmonize and to provide their complementary focus, I think, will make a big difference. And we're very eager to see how that actually will work.

But, you know, for our project, even with the DOE selection for funding, and the credibility, the vetting, essentially, that that provides, not to mention the money, it still is a challenge to get the rest of the money. Because of the nature of the market and the nature of the technology development we're in.

And then, of course, you've got now contradicting policies and political forces that are sending some mixed messages about what's supposed to work and what makes sense and what doesn't make sense.

So, I'm going to kind of step out a little bit and make some recommendations. One, there is a California ethanol producer payment on the books here. But it's obviously not funded. I would recommend and would love all of your support, and you can contact Tom Koehler after this meeting, if he's still here, about this specifically.

But that conventional ethanol in this state, of which none of the plants are now operating, should get a 12- to 18-month price support, producer credit, you know, two cents, three cents, five cents, something like this. But have it sunset, and transfer it from conventional biofuels into advanced biofuels.

I mean if we want production in this state, it's going to have to be supported. It's going to have to overcome some of the natural obstacles of siting here and developing here. But otherwise the lofty goals for renewable fuels are going to be very very challenging. And it's going to continue to be an import market, I think.

But I think the simplest, most important thing we could do to advance biofuels is to have every car be a flexible fuel vehicle. I think that's the simplest, easiest kind of policy recommendation, is to accelerate the conversion of the fleet.

We know it doesn't cost -- costs virtually nothing. The car companies now are not charging more for an FFV versus a non-FFV. I mean this is really -- this is one of the things which catalyzed the industry in Brazil, is just every car should be an FFV.

And on that note, I'm finished. Thank you.

(Applause.)

DR. KAFFKA: Any comments?

MR. SHIPLEY: Greg Shipley. My question -- you got DOE funds?

MR. PETTIT: Yeah.

MR. SHIPLEY: Are you required to go at prevailing wages on that? And then the second one is did I understand you correctly that you're going to start producing ethanol from corn using the BioGasol process? Or is it going to go --

MR. PETTIT: Okay, let me take the latter. The prevailing wage, that's a part of it, absolutely. There's that and a thousand other requirements. So it's a full-time job just to keep track of all the bells and whistles and, you know, that you've got to. And it's worth it; it's $24 million, right. So, and it's the taxpayers' money. So we need to follow the regulations, and that's one of them.

But in terms of BioGasol's technology is for cellulosic, lignocellulosic material. So we're not -- what we're doing is we are essentially having a parallel process that is utilizing some of the same, you know, for example, this is a fermentation-based process. While it's a separate fermentation, there's some commingling at distillation. So, downstream.

So what we're trying to do is use as much of the infrastructure and system as we possibly can. Again, it's capital avoidance, and it's also obviously taking advantage of what you've got. But there will be separate feedstock streams. Okay.

Yes, sir.

MR. BRENDEL: Hi. Alex Brendel. I'm a big fan of alcohol. I think alcohol can be a gas. I just got my lawnmower running on 180 proof alcohol. All I had to do was tweak the carburetor fuel air mixture screw.

I'd like to know, I'm also excited about the potential for cellulosic ethanol. Can you tell me what's the technological barriers for cellulosic ethanol? I mean is it cost of enzymes? Is it the whole process? What's preventing, or what's in the way of cellulosic ethanol today?

MR. PETTIT: I mean there are a series of technical barriers. I think all of which progress is being made on them. You know, there is cost of enzymes. That's part of it. Production of enzymes. The pretreatment process, the cost of that. It's very capital intensive.

I mean right now we're seeing the more realistic claims. This is $7 to $10 a gallon to build a plant. Whereas, you know, corn ethanol is $2 a gallon. So there's huge capital constraints around that.

The general feeling is that relatively soon there'll be -- operating costs should be under control. There's a sense that you're trading some capital for operating costs if your feedstock can hit certain prices.

So obviously just like an commodity product your feedstock cost is going to represent 70 to 80 percent of your operating costs. And that's the same thing with cellulosic ethanol. And so therefore it's going to be as vulnerable to that feedstock fluctuation.

And so the same thing that the corn ethanol industry needs to do in terms of diversification, is going to have to happen with cellulosic ethanol, as well. I think people understand that, and that's why people talk about biorefineries, and are looking already at ways to diversify and insulate against some of that. But the fundamentals are still there.

DR. KAFFKA: We're going to move on. Thank you.

MR. PETTIT: Okay. Thanks.

(Applause.)

DR. KAFFKA: Our next speaker is Rahul Iyer, who happens also to be a board member of the Collaborative. We're very grateful for that.

Rahul has spent ten years advancing the low carbon fuels industry. And most recently he founded and built Primafuels into a revenue-generating company with commercially deployed biorefineries and equipment. It has also a significant intellectual property portfolio.

He's designed the business models for the development of business plans and subsequent fund raising for approximately $15 million -- is that million dollars?

MR. IYER: Yes, it is.

DR. KAFFKA: Okay. Anyway, private fuels and technology leader and pioneer. And has been recognized as such by the World Economic Forum.

Well, there's a lot of other things that he's done, but I think in the interest of hearing from --

MR. IYER: I agree.

DR. KAFFKA: -- we'll go forward.

MR. IYER: Okay, thank you. Thanks for that.

The assigned topic on today's agenda is about siting facilities in the state of California. Primafuel is a California-based company. And so we're very familiar with a lot of the unique regulatory challenges that our state has established.

Having said all that, as an introductory note, a couple of years ago I spoke at a Collaborative Conference on the subject of price signals, and appropriate policy framework. And, of course, this was while the low carbon fuel standard was still in its early stages. And the real question a lot of us in the marketplace had were what types of durable and clear price signals will be produced by these regulations.

I think that's still a relevant

question, and it's something that I'll allude to in this presentation. But one thing that I'd like to speak about in this presentation is no longer how does the state insure that the policies produce price signals, but how does the state insure that the price signals are sufficient to drive sufficient investment. And we'll talk a little bit about that in this process.

Now, Primafuel, itself, has two main business units. I'll give you a quick introduction of the company mainly so you can ferret out my biases and determine whether you want to believe what I'm saying or not. So I'll spend a little time on that, and we'll talk about renewable fuels in California, which is frankly, kind of a black box. A lot of folks believe they know what's going on in the renewable fuels industry in California. I'll give you our opinion.

And then specifically we'll talk about one part of the supply chain that we're focused on in this presentation which is on bulk liquids terminal infrastructure. Something incredibly boring, but vitally important. All of the fuels that are sitting in the gas tanks, all of the vehicles around this building, at some point sat in a terminal facility, a bulk liquids terminal facility prior to being blended and sent to a retail or fleet refueling application.

It's one of the major bottlenecks in California's fuel infrastructure. And something that is in serious need of investment and reinvention as we deploy aggressive policies like the low carbon fuel standard.

And finally, we'll talk about our specific project in Sacramento, which is actually a two-sided project, biofuels production and a bulk liquids terminal. And some of the exciting work we've done there, particularly on entitlement and permitting.

So, again, quickly, Primafuel has two main business units, a technology side of the business and an infrastructure side of the business.

On the technology side we're focused on modular biorefinery technologies that actually help existing biofuels producers become significantly more efficient and diversify their products.

Something that a lot of folks, perhaps,

are not aware of, is that for every kilogram or unit mass of fuel that a corn ethanol plant makes, or a cane ethanol plant makes, or even a cellulosic ethanol plant makes, there is a roughly equal amount, if not greater amount, of very low value byproduct. It's frequently a waste product.

This is particularly true in Brazil with the cane ethanol industry that produces vast amounts of waste vinasse, which is a disaster to get rid of, in fact.

So, what we've done is develop some interesting technologies that extract a number of high-value platform chemicals that exist as fermentation byproducts from all of these processes. I'd love to talk about that, but today we're talking about infrastructure and permitting.

And the reality is that in certain markets like California there are serious infrastructure bottlenecks. Now, in renewable energy a lot of people are talking about smart grids and so forth, and how we need to invest heavily in improving the grid infrastructure to get new forms of renewable electricity into the market.

That same is true with renewable liquid

fuels for the transportation industry. In fact, in California, while our grid is in pretty bad shape, our fuels infrastructure is in even worse shape. The average bulk liquid terminal in the state is pushing 45 years old. And it's old, and it's running at maximum capacity. And we've got some challenges ahead of us.

And so to that end we're developing Primafuel-specific low carbon fuels terminals to help California meet these very aggressive mandates.

So, again, the two sides of the business. Focused on infrastructure here today, developing bulk liquids terminal assets. And very importantly, wrapping around those terminal assets all of the compliance solutions that the regulated parties, the oil industry broadly, in California will need to make sure that they're meeting things like the low carbon fuel standard.

All right, so let's talk about renewable fuels in California. Hotly debated, right. Ethanol hotly debated; biodiesel and its merits hotly debated. And while all that debate has been going on, the reality is is that the biofuels industry has continued to grow globally. And has now become what, in my opinion, is a permanent part of the energy landscape. And growing.

And I think that's evidenced by most recent EIA report. Whether you trust the DOE's data or not, that's your decision. But I will suggest that that quote is pretty powerful.

Shell has now made some recent statements at one of their shareholders meetings, in fact, canceling their investments in wind and solar in favor of biofuels, which I think is meaningful. And Valero is now not only the biggest oil refinery in the country, but the third largest corn ethanol producer, as well.

These are very very serious changes. And, in fact, these have all happened just in the last few weeks. So, when one looks at The Wall Street Journal and other reports about the ethanol industry struggling and struggling to keep the lights on because of adverse economic conditions, the flip side is also very interesting. There's very very permanent changes happening in the energy marketplace that make, I think, the medium and long term for biofuels extremely bright.

So, what drives the market in California? A number of things. First is the renewable fuel standard, which you heard Harrison from Pacific Ethanol allude to earlier.

I've been showing this chart for a long time, the one on the left there. But finally the EPA is actually moving on putting a fine point on some of these regulations. It is, in fact, the first regulations in the United States that regulate greenhouse gas emissions. That makes it extraordinarily important.

People talk about the potential benefits of a cap-and-trade system or a price on carbon for the clean tech industry broadly. The reality is that we already have greenhouse gas regulations on the books for the biofuels industry nationally. That is a very important fact to remember.

And what that means, from a greenhouse gas reductions perspective, you'll see reflected in that bar chart there, it means that nationally speaking gasoline is going to end up at the 36 billion gallon blend level with a 4 or 5 percent greenhouse gas reduction on a lifecycle basis, falling far short of California's aggressive targets of 10 percent.

So, now when we reflect what the RFS can do for California's LCFS, we see in the orange and green chart up there that the federal mandate doesn't touch what California's trying to do with the low carbon fuel standard.

It means two things. One, it means we'll have to use a lot more low carbon fuels than the rest of the country, a lot more, two or three times as much. And, two, it means we'll have to use different types of low carbon fuels than the rest of the country. And that can be a good or bad thing, depending on which side of the table you're on.

Interestingly, our analysis shows that looking at what is available today, and what will be available over the next ten years, we think roughly half of California's gasoline and diesel market will be changed to something else. That something else will be a mix of electricity and biofuels and other interesting things.

But, literally, the low carbon fuel standard mandates half of that market changing in pretty short order. That is a sea change, that is a major industrial shift that requires clear policy signals and a huge amount of capital.

So, as I said, the renewable fuel standard and the low carbon fuel standard will, at a minimum, triple the amount of renewable fuels California is using by the year 2020. Today's roughly billion gallons are going to grow in excess of 3 billion gallons.

As I mentioned earlier, the terminaling capacity in the state, not talking about the ability to produce renewable fuels, which is expensive, tricky and complicated. Just the ability to store it so the market can use it at a reasonable rate with some reasonable reliance that it's going to be there.

All these terminals are running at maximum capacity, and the ones that are there are falling apart. And, in fact, many of them are being shut down. In fact, some of the terminals in the Port of Los Angeles are being shut down as we speak.

So instead of expanding capacity to store and blend these fuels, we're actually reducing our capacity. So fundamentally that means that existing infrastructure is completely inadequate to meet this new demand. And we think that multimodal hubs that are technology agnostic, that give the state as much flexibility as possible to import, to produce instate, to produce from out -- to import from out of the state or offshore is critically important for us to meet these goals.

So, using some of the Air Resources Board's recent numbers in the most recent low carbon fuel standard draft, which I'm sure you've all pored over, we look at the basecase of assumptions of a fuel mix that they see in 2020.

We also used the Energy Commission's storage or fuel storage calculation methodology and arrived at kind of a challenging situation, using the state's own numbers.

And that situation essentially amounts to the fact that this state needs more than 200 million gallons of new storage of low carbon fuels by 2020.

It doesn't sound like that much, right? 200-plus million gallons shouldn't be too much. The problem is is that that's a number of new dedicated terminals.

Now, this is a very busy slide. This data's extraordinarily hard to come by, it's not proprietary. So if you're interested in unpacking the black box that is the California's fuels distribution infrastructure, you should write these numbers down.

There aren't that many places where ethanol currently comes into the state. And they're controlled by folks that don't necessarily come from the biofuels industry.

What we have proposed and what we've been developing here in the Port of Sacramento is a new northern California-based mutlimodal terminal similar to what's happening in southern California at the Shell Carson Terminal. Which currently supplies Los Angeles with essentially 100 percent of its biofuels, which by the end of the year will probably be in excess of 8 or 9 percent of the gasoline we use.

So what we've developed here at the Port of Sacramento just a few miles that way is a fully permitted or shovel-ready terminal that we continue to develop.

What's interesting about this is that it's the first new marine-based terminal in the state in more than 25 years. That's a little bit disturbing because in that period our population has doubled, our fuel consumption has basically doubled, and we're looking to do a lot more growth in that space, looking forward.

So the question ultimately is if we need to build a new terminal roughly every year to meet the low carbon fuel standard, and this is the first one permitted in 25 years, something's got to give.

Quickly about the terminal. It's co-located with another project of ours, which is actually some advanced biofuels production. But the terminal, in and of itself, you would think should be a fairly straight shoot, right.

It's, you know, steel tanks with concrete and so forth. It shouldn't be that hard to permit such a thing. Reality is that it is.

As I said, the first new terminal in 25 years. So there's a little picture of it for you.

So what did it take to get shovel-ready? We currently hold more than 105, 106 different permits, which means we're shovel-ready. Forty different types of permits from 25 different governmental entities across actually five -- four jurisdictions and an additional shared jurisdiction, which are exceptionally fun to deal with.

There are 25 more permits required for operation, which we're currently working on.

There's also the CEQA process, which interestingly, this is the first bulk liquids terminal permitted since CEQA has existed.

So this is something that required a lot of teaching. In fact, we've joked about changing our logo to Professor Primafuel, because invariably what we end up doing is doing a lot of hand-holding and a lot of teaching. Which isn't necessarily a bad thing, it just would be exceptional if we got some support from the state or from the regulatory agencies to do that.

There's a lot of that to do in the private sector. I don't think it's frankly capable of doing it all. What's worse is that there are certain interests in the private sector that are more powerful than those proposing solutions who can also do that, too. And so there's some competing interests there.

What it ultimately means is a high degree of uncertainty for investment. What I'm not advocating here is a wholesale elimination of all of these environmental protections and so forth. I don't think that that's reasonable or even smart.

What I am suggesting here is that there

needs to be a lot more transparency in this incredibly opaque system because it's one thing to teach the regulators what the regulations are, it's another to try to teach investors how those regulations work. It's a very very challenging thing to do. And I think as long as the state is going to be in the business of creating market-leading or market-based nechanisms, I think the state therefore has a responsibility to educate more than just the regulated party, but also inform the investor public at large.

So, again, if markets are to be made, and arguably -- and I'm a huge fan of AB-32, and despite the fact that I have questions about indirect land use change and so forth, I think the low carbon fuel standard is brilliant. And I think it will -- it's the first domino in a lot of international and exciting work that's going to go down here in the next few years.

The ARB, in my opinion, has been pretty good at bringing into the conversation multiple different stakeholders, including legislators who are getting smart about the law that they signed a few years ago, regulators in various regulatory roles in the state, and businesses that are in the solutions business.

There are a lot of us that have been involved. And, in fact, if all of you had the opportunity to either attend or watch online the low carbon fuel standard hearing a couple of weeks ago, you probably noted that most of the comments were from companies that were going to gain from these regulations, like mine and others.

You didn't hear that much from companies that were going to lose that 50 percent market share of the fuels market in California. In fact, if you look back you didn't hear from any of them. And you might want to ask yourself why.

And I think the answer is that there hasn't been that much public follow-through from our regulators on this. That is to say, bringing along the regulating parties -- and we all know who they are -- to provide public input, not just in closed session, public input into these regulations so we can find out what they're really thinking.

And very importantly, bringing along the lenders and the equity holders who today do not understand what's happening in the state. And currently are reading The Wall Street Journal and reading op-eds that say that AB-23 is going to kill the California economy. As opposed to what we believe is the case, that these types of regulations are tremendous investment opportunity.

What ought to be happening in our estimation, or at least in my opinion, is that California needs to be marketing itself similar to how developing economies market themselves internationally to attract foreign direct investment. Because that's what California requires today, billion and billions of dollars of foreign, outside of California, and within California, direct investment to meet these needs.

And as long as the international press or the domestic press is making the case that these regulations are costly and burdensome and are not an investment opportunity, we all have a very serious problem in front of us.

And I think this is something that our Governor understands in theory, but does not have wholesale support to go make happen.

So I used a lot of these slides from a few weeks ago, and this is a gentle admonition that was provided to the Energy Commission a few weeks ago when we provided testimony at the fuels infrastructure meetings.

But one of the things that it seems to me would provide a very very strong signal to the investment world would be to require these regulated parties, again, to speak publicly about their obligations.

Again, if 50 percent of the gasoline and diesel and jet fuel market is going to fall to competitors, to the oil industry in California, it would be very interesting to see what happens to investment flows if representatives of that industry came out and publicly said that that was what's going to happen.

I contend that investment would flow very very quickly into the state to take advantage of that opportunity. Instead, those types of bold analyses are not being shared broadly. And instead we're sort of pretending that the low carbon fuel standard is just going to magically happen, and it's not going to cause any pain.

And, in fact, the Air Resources Board is partly guilty of this impression, too. There was a movie that the board put on their website that basically said end-users won't notice any change; infrastructure doesn't change; nothing changes except we magically reduce carbon.

I contend that a lot of change has to happen in order to meet these goals. I think the goals are good ones and important ones to meet. And the only way we're going to get the investment to actually meet these goals is if we're a little bit more serious and a little bit more vocal about what's required.

And so to that end I propose to the Energy Commission, who's in charge of the fuels infrastructure in California based on their mandate, that they ought to require players in this space to either state in confidence to the CEC, or publicly even better, what their plans are to meet these regulations.

Because I contend that they have no such plans. But if those plans were to be made public, you would see the need for investment defined. And that is what the Wall Streeters and the international hedge funds and so forth just don't understand right now.

And so in any case, with that I'll open it up to questions.

(Applause.)

MR. SHIPLEY: Greg Shipley. Small

industries have a hard time raising funds and typically require bonds. I'm assuming that you need to have a bond for your terminal in Sacramento?

MR. IYER: The terminal's actually being financed with both debt and equity, so there are no publicly backed bonds involved.

MR. SHIPLEY: No, I was talking about completion bonds.

MR. IYER: Oh, completion bonds and wrap-arounds, absolutely, yes.

MR. SHIPLEY: And my question is do you think that it would be easier to get financing if the state of California, for instance, would be able to back up biomass companies with a bond-type of facility?

MR. IYER: Two years ago I would have said absolutely. Since then the state's credit rating is not quite what it was. And so, you know, it's an interesting thing. Even some of our offtakes with the state are not quite as valuable as they were a couple of years ago. They're being discounted a little bit more.

So, unfortunately, I think this financial market and the realities that the state is facing sort of precluded the efficacy of that move.

MR. NICHOLSON: Bill Nicholson. Having the ethanol or the alternative fuel in your fuel tank is still a long way from my car. What kind of changes have to be made in that distance?

MR. IYER: Sure. So, if we look at the fuel supply chain, and we look at the place in which conventional fuels and low carbon fuels, so to speak, converge, it's really at the blending terminal, which is downstream of a bulk liquids terminal.

There is some discretionary blending occurring at bulk liquid terminals, but not so much.

Blending terminals in the state, there actually are highly diversified industry, lots of independently owned terminals, and it's pretty competitive. And for that reason investment is being made.

The bulk liquids terminal space is not competitive. There are a few stakeholders that control most of the industry. And I'm not going to say that it's anti-competitive, but it is non-competitive. And as a result that is, in our estimation, the most important bottleneck in the supply chain today in California, and looking forward a few years.

The blending terminals certainly need upgrades and so on and so forth, but these are more component-based rather than new facilities, or expanded capacity. I think we believe that really most of the pain is slightly upstream of that, the second-to-last mile, if you like.

MR. THEROUX: Michael Theroux, Theroux Environmental. We're working diligently on turning waste into syngas, at least, and struggling with the next step of how to take that syngas to fuels.

Can you speak to the relationship that you see of that pathway to get to commodities fuels?

MR. IYER: Sure. So a little bit more on the technology side. You know, one of the reasons why we focused on the technology side in drop-in replacements for existing platform chemicals is precisely because of this specification challenge.

The ethanol industry worked for a long, long many years to get through the environmental testing with the EPA and Health and Safety testings and so forth. To do that with boutique chemicals and boutique products is, in this environment, probably a nonstarter, I would argue.

Now, condensing syngas into synthetic hydrocarbons, I think, could be, if you do it right. You know, a drop-in replacement for a C-16 or C-18 fuel.

You know, I'll actually dovetail this with the terminal issue that we just discussed here. Almost all of the terminals and tanks that are permitted in the state of California are permitted for one product, either gasoline or jet fuel or some such chemical that has an ASTM specification.

What we did, and part of the reason why it was extra-challenging, is that we permitted our terminal based on re-vapor pressure toxicity and flammability. Rather than specific chemicals.

It was tricky because we had to teach all the regulators what all that meant.

But what it enables us to do is to store everything from Fischer Tropsch to methanol, to ethanol of various kinds, biodiesel, and a number of other low carbon fuels that need to get into this marketplace.

Now, to your point, the world of specifications and standards, and the world of regulations don't seem to talk to each other enough. I don't know how to fix that. That's a huge, huge challenge. But it's an area in which, again, you know, to Secretary Kawamura's points earlier in the morning, that communication, broad-based communication across these currently stove-piped agencies is mission critical.

So, you know, when someone's trying to permit a new production facility or a new tank or whatever, it would be really nice if that local fire marshal could talk to that local AQMD, could talk to the Air Resources Board and actually figure out what, say, a Fischer Tropsch fuel was. And get an answer.

But, you know, to leave it up to a pastiche of small, underfunded startups to do that education and outreach is probably not a good idea. As much as I enjoy doing it.

Yes, Steve.

MR. SHAFFER: Hi, Rahul. Steve Shaffer. Just a couple of comments. To the last point, in terms of sort of the environmental regulatory process versus the standard setting, the ASTM world, the California Department of Food and Agriculture, Division of Measurement Standards is sort of that window into sort of both. And they coordinate very well with the Air Resources Board. So I would direct you to the Division of Measurement Standards, from my old agency.

The other is in terms of I absolutely agree, I think one of the themes of the day is infrastructure, it's various forms. This is a similar, at least analogous, situation to the phase out of MTBE and also the development of reformulated gasoline.

And the refiners and fuel marketers all were engaged, provided comment. They did in low carbon fuel standard, as well.

You could get a window into how they dealt with that infrastructure issue through the CEQA process. They were in backdoor meetings and what-have-you. But if you really needed to find the information you could through the CEQA process.

MR. IYER: True. And indeed, the CEQA process, despite the fact that that flow chart was really ugly, is a well-defined process. And it takes a long time; and it can be frustrating. But it does work.

And so as much as, you know, for-profit companies come up here and rail against permitting and how difficult it is, and da-ta-da-ta-da, again, I think the reality is that if regulations are going to make markets, if the low carbon fuel standard is going to be a technology-forcing standard to change markets, there are other aspects of the market that need to be revisited, as well. And that would be the only point there.

DR. KAFFKA: Let's thank Rahul --

(Applause.)

DR. KAFFKA: Our last speaker for the morning is Hanafi Fraval. And Hanafi -- better put my glasses on, actually, I want to do a good job -- has, for 30 years, worked in high tech property areas in renewable energy. And for the past 11 years he's focused on environment-positive technologies and waste conversion, including renewable energy generation.

There's a 2.5 megawatt, biomass-driven installation in Eagar, Arizona, that is related to his work, comes from his work.

Currently he's chairman of the

California Ag Biomass Alliance, and he's also CEO of FBE California, Incorporated, which is rolling out a patented advanced anaerobic digester system technology. There's a lot more there, but I think we'll leave it to you.

MR. FRAVAL: Thank you. I'm going to talk today at a fairly basic level. This is about the forest, and not necessarily about the trees.

The first thing is why are we all sitting here? Why are we doing this? And I ask this question because like yesterday I was reading one of the CEC reports, and there was a little piece in the front about climate change.

And then as you get into the report the rest of it was how quickly we need to get into downward pressure on the pricing for these renewable energy technologies, and how we've got to produce at the same kind of levels that we have in the past relative to European and so forth.

So, it's not just economic. It's the whole thing, social, environmental and so forth. And it's this triple bottomline needs incentive-based solutions. And it also needs concerted will and action. And not individual. We've got to kind of leave our hat at the door and join forces more. Let me go into why.

First of all, when we're talking about incentives the first image that comes to mind is handout. It's not a handout. This is to produce a level playing field. And I'm sure -- unfortunately, I wasn't in some of the earlier sessions that we had, but I saw the program and I know that there were discussions about the cost of health and the cost of the environmental issues, and the security in the Middle East and so forth.

Now, the other thing I'd like to really get across, one of the earlier speakers was saying, this is something I would like you to remember this image. This is our industry.

If you look at the number of biomass plants typically they range from 2 to 25 megawatts or thereabout; there's 26 of them in the state. And a lot of them have been through a lot of history. And there's very little out there in reality. And there are a number of folks, like some of those in this room are putting in a tremendous amount of effort. And this is an immature, tiny, little industry.

And it has some characteristics -- by the way, I'll mention that I understand this because I was in the laser industry. I had one of the very first laser companies that started out in Europe. And that was an industry that was a solution in search of a problem.

And there were a number of issues which are not common to an already developed, or even a developing industry. This is a new industry. And there are some aspects or some issues relating to this industry that are different even to that.

We start with this truckload of stakeholders. The list on the right is the only list that talks to each other and is really together. And they kind of talk to the other guys, but they talk to the other guys with a pre-written agenda. And they'll go and grab somebody for five minutes -- and I'm being facetious, of course -- and hear what they say. And then they go back to their place, and the decision is made by the group. And it's not quite like that.

There's a lot of sincerity and people are trying to do the best. But this very large body of stakeholders is not together at the moment. The scope of the challenge is unreal. The dotcom thing is a drop in a bucket. Those kinds of industries, the IT industry and many others, are a drop in the bucket relative to energy, which is 10 percent of GDP.

And our objective in this state of 33 percent renewable portfolio standard by 2020 when we're pretty unsure about whether we're going to make the 2010 one, is another example.

We need big solutions. We realize they've got to be privately funded. We've got to have a positive attitude to change. And we need incentives to make it happen. And this is still within that context of immature industry. Remember the two kids.

The other thing that I've been interested to note is that when I'm talking to any of the stakeholders, and I'm very much including the regulators in this. The regulators are often shown as the bad guys. They're good guys. I mean what they do is going to develop our industry, is going to spur innovation and so forth.

Everybody, on an individual level, is wanting to do the right thing. And even a fraction of stakeholders would like to do the same thing.

Guess what? We've thrown millions at the problem in the last 20, 25 years, and we don't have much to show for it. In fact, there's very little infrastructure, the training, the maintenance, and there are not enough confident customers, feedstock owners, farmers, utilities to take us over the -- okay.

I use a Mac, and I think this is the result.

(Laughter.)

MR. FRAVAL: The picture on the left is an empty toolbox, completely empty, opened out. The picture on the right is stacked full of tools. The one on the right is what we need.

Now, due to this immaturity, as I said, there's no uniformity of -- there's no uniform industry direction and voice. Project developers and growers and government and financial institutions are not together.

The legislation is mostly sticks and no or few carrots. We've heard about the regulatory issues, the conflicts. What we irreverently call the regulatory porridge. Forgive me, regulators.

And then if we look at the finance, and this is at the heart of what I'd like to get to today, if we looking at the financing for a project, there are three elements.

There's the gap financing where you need typically 50 to 500K to assemble your project with engineering support for the permitting and the other things that you have to do to put a project in place before it's ready for its senior finance.

Having got through that, you've got to put together your debt and your equity. There are also issues with the power purchase agreements that we have to write with the utilities.

So, the first part of what we would like to propose, and there are many ways of doing this. It can be a roadmapping process; it can be some kind of ongoing alliance where there is a real working group comprised of the working group, the interagency working group. And those representing all of the other stakeholders. And we contend that without that, this is going to either be a very much more difficult task or it ain't going to happen.

The second thing that we need is the gap finance initiative. And I'd like to take you, for that to, again one possible idea is that some of the nonprofits get together and between them and their stakeholders, people like banks, government plays a role even in broke California, foundations, associations, individual philanthropists, we need a fund of, to start with, 1 or 2 million.

And the reason to start at that modest level is it's got to be proven out, put together and a project assessment panel. We already got a candidate panel, but we'd welcome, with any people or groups that are willing to work with us, putting together this fund. So that it can provide nonrecourse loans to technologies that we think are not just promising, but that are pretty sure to hit the mark.

The second financial piece is the equity finance incentive. And here's where we go to Oregon. And you've already heard about the BETC. And whether it's done this way or some other way, Oregon really has a model plan here.

The five years, 10 percent per annum of capital cost that they offer to projects, and they will market on your behalf to taxpayers, and cut you a check -- it's the taxpayer, I think, that cuts it, but they cut you a check for 33.5 percent of the capital cost.

That means that you can go to your investors and you can tell them you are going to get your money back from this tax credit, is what it boils down to.

We also know that there's a federal device of this kind that is coming on. But like the farm bill, until I see the written word and the detail, it is not a real thing. I hope it's a real thing. It's sorely needed, and it needs to be additional to any state incentive, not instead of. Otherwise, again, it may not work at all.

Third piece in the financial puzzle. Yeah, California may be broke, and it may have less than top rating these days, but it doesn't matter. This is the only way that this is going to happen.

There needs to be a loan guarantee program which is run at state level. And, again, there's one talked about at federal level, but there needs to be an additive program, guarantee program, at state level. And banks will not lend without this.

I'm convinced from our discussions with banks. And we want to bring them to the table because we feel that they have a very important role to play in this.

Remember, we're talking toolbox, to do

what? To get actual projects deployed that are going to solve the problems that we're talking about.

These three financial tools are absolutely essential in our opinion.

The other thing is that on the permitting process why not be incentive-based there, as well? For example, in the biomass field there's no reason why zero emissions projects shouldn't be offered, first of all, a fast-track process; and secondly, simplified permitting. Why not? There is no reason why that shouldn't be the case.

The typical project may take 50 or more permits to get going, and -- if it's a biodigester. But if it's a zero emissions biodigester there should be huge incentives from the state to do that. It's in all of our interests.

We could go one down with a program B and say, well, if there are, you know, 15 or 20 percent down on the minimum, then they get to enjoy a fast-track process.

And then for the rest of us, there needs to be more refinement. The permitting process has got to be speeded up with maximum response times built in. And better, more transparent processes that are more uniform.

There's a lot that I could say about power purchase agreements, as well, but perhaps I'm going to go on with the others. There certainly are a number of things that can be and should be addressed. We've already heard some of them today. I'd like to see more transparency above everything.

The other thing that I think this needs, because I'm trying to be real world here, we need to take this body of, if we've got enough support for it, the body of these proposals and say, okay, let's try it with a limited number of projects, a limited period of time, two, three years, something like that. Or five, ten projects. Full commercial projects, no pilots.

To take them through the process that we devise under these recommendations or these suggestions. In order to test that it really works as advertised. So that we refine the process to the point where we begin to kick-start a real industry that is just beginning to move out of immaturity. And it all needs to be incentive-based.

And what I think we need to do next is first of all to consolidate the stakeholders. Get some kind of different discussion going, working groups with smaller working groups on the specific proposals, to find out ways, above all, that we can work within the existing bodies of regulations. Try and avoid thinking in terms of new legislation, but rather working with what we've got to, as quickly as possible, so I'm not talking about years and years, as quickly as possible, to put together a group that is a group for action. And to then put them into the context of full-scale commercial.

This is just a blurb about the Ag Biomass Council and the Ag Biomass Alliance and my company.

Thank you.

(Applause.)

DR. KAFFKA: Any comments? Please give us your name.

MR. KIM: Yes. I am Kim from Korea. I flew day before yesterday. So, we developed this biomass energy plant since ten years ago. And so summer 2001 when I came here, United States, nobody concerned about biomass technologies.

Now, we developed biomass technology from biomass-to-electricity, biomass-to-thermal energy, to this industry like fish farming who needs energy.

And some greenhouses, some industry, some tropical area, we provide some chiller house. We outsourcing technology with refrigeration our plants using biomass technology. And so combined cycle technology.

There is a huge area of new technology area from biomass energy. We are developing from syngas to gas turbine and combined cycle with gas turbine and steam turbine, still that going on.

So I think ten years ago when I come here, so nobody think about, it's just like a dream. Now we are coming through the dream. It's developing.

So it is really so new industry fields. And we are also exporting our technology to a new European country, in U.K. and in Norway, and 2009, the first of July, a landfill ban in EU country started. So they are restricted to landfill.

So what I'm going to do to ask you is there's a very developed financial program all over the world for the biomass technology. So, I'm first saying that you have expressed, you have been speaking about financial support to biomass industry in California.

I think there is so many barrier and legal barrier to get to some permits in California area. So, I wonder, is it possible to get the permit like a one-stop permission system. So fast-track permission system like that. Is it possible from EPA or some other agency in California?

MR. FRAVAL: That's a good question. I asked that question of a panel of regulators in, I think it was a conference in Tulare. And they did not think it was a good idea; and there were a number of cogent reasons given.

But what they did say is that they're trying to develop a more transparent and coherent application process that was web-based. And if it's web-based, that means it's going to be the same for everyone; not interpreted differently depending on which town or community your project is based on.

I think it's a watered down response, but it's a step. And they were talking about five years for this process, which is hopelessly long.

You know, the truth is that we're beginning to wake up, but the true level of commitment can only be judged by action. And, you know, we've got to be realistic, and realize that there's a lot to do.

And in California, I can't think -- maybe there are one or two other places which are as difficult, but there's nowhere more difficult than California. And I think it's going to be a long, long process before we get to that.

The Ag Biomass Alliance has considered providing a service that would give developers a one-stop shopping process. We would develop that service by considering it at the moment. That's probably the best we'll be able to do.

MR. KIM: Thank you. So for developing projects, there's one more important thing, is we were technically provided, during operation process, after firstly your bids, then during operation, with feedback all technology from operation fields. That is very important.
So slow permits and the long-term permits makes developments slower, too.

Also financial problem for the project

is extremely important. So, at this moment if California in the situation its legal permitting process should be shortened. Then it makes your business make it vitalize, including financing matter, in my experience.

That's my thinking at this point.

MR. FRAVAL: If you talk to most consultants, well, the ones I've talked to anyway, they will tell you that you should allow about three and a half years for permitting.

Having said that, I know one digester company, anaerobic digester company, that did it in six months. And I congratulate them. And I think we have something to learn from them. And they are way ahead of the pack. Because most people are taking three and a half years.

MR. KIM: Thank you.

DR. KAFFKA: Thank you, again.

(Applause.)

DR. KAFFKA: I find myself thinking that California is known for change and for even volatility, though we seem to have institutionalized a culture that resists change in an ironic way.

Anyway, I want to thank the speakers

this morning. We've had a very informative session.

We're going to have another very challenging and informative session in the afternoon. I think we're scheduled to start here at about 1:15. Lunch should -- I think they'll open the doors any minute now for lunch, so thanks again to everyone who spoke.

And same place, food's in the same place. See you in about 45 minutes.

(Whereupon, at 12:25 p.m., the morning session of the California Biomass Collaborative Annual Forum was adjourned, to reconvene at 1:00 p.m., this same day.)

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AFTERNOON SESSION

1:17 p.m.

DR. KAFFKA: A couple of them are on forestry biomass. One's on probably primarily integrated waste management. And then we're going to finish up with a discussion about agricultural biomass. And then finally a talk by Matt Rudolph with a roundtable of sustainable biofuels to really talk about sustainability standards.

Our session this afternoon focuses on sustainability in a broad sense. And we've gone from an overview of discussing what the meaning of net benefits might be for biomass energy, to talk about barriers, to this morning talking about incentives. And lastly, now we have to talk about, I would say, the integrative topic of sustainability.

Our first speaker this morning is Dr. Malcolm North. And, in fact, I found out, I didn't realize this, that we're in the same department at UC Davis.

(Laughter.)

DR. KAFFKA: So you always learn something at meetings. Dr. North is a research ecologist with the U.S. Forest Service, and he's stationed at UC Davis. He's an Associate Professor in the Department of Plant Sciences.

He got his PhD in forest ecology from the University of Washington, and has worked at the Forest Service in California, based in Fresno, I guess, starting in 95.

He focuses on the effects of disturbance on ecosystem structure and function in western coniferous forests. And he's run, for ten years, the teakettle experiment, which examines the effects of fuel treatments on the status of those mixed conifer forest systems.

So, Dr. North. Thank you.

DR. NORTH: Well, thank you for having me here today. I often speak to forest ecologists and forest managers and so I may guilty of occasionally using terminology, or even worse, jargon, as I am partially a federal employee. So, please, please, if something comes up that I'm skimming over, I'm going too fast, interject right away, don't wait for the end or for obfuscation to occur.

What I do want to talk to you about today is several pieces of work that I've worked on particularly over the last five to ten years that's really come together here just within about the last year, looking at both forest carbon, fuels treatments, disturbance effects on ecosystems in the western U.S., particularly in the Sierra Nevadas.

And I'm going to suggest to you that I think we've got some ideas of how possibly to move forward and get past what we currently have, which is largely kind of a logjam or stalemate about fuels treatments in the Sierra Nevada.

And a lot of that has had to do with a really strong focus on fuels treatments without always considering some of the other ecological values that are very near and dear to other constituencies in California.

So, briefly I'm just going to quickly give you a little summarization on fire suppression and fuels treatments, which I think is probably familiar to most folks here.

And then I'll deal a little bit with carbon dynamics. I've been working on a series of papers on this aspect, kind of looking at the tradeoffs in forest management on emissions versus storage.

And, of course, as you know, forests

have a potential to sequester a fair amount of carbon and offset some anthropogenic rise in CO_2.

I'm then going to look at why fuels treatments aren't being widely implemented, and the two main things that are constraining those economics and wildlife issues.

And then finally talk about a new management strategy that may help resolve some of that stalemate.

So, just briefly here, on the very large, widespread effects of fire suppression, you can see on the right-hand side what's called a condition class map which largely shows where you have departures, the most significant departures from active fire regimes in the United States.

And particularly you'll see the concentration of yellow and red areas is largely concentrated in the western United States, where many of these ecosystems historically experience fire anywhere from every five to 20 years. And most of them now have gone 100 to 130 or '40 years without a fire, which has led to very high fuel loads.

And you would think, a great opportunity for removing biomass from these forests to both reduce the fuel loads within them, work on some ecological restoration issues, and obviously provide some biomass that might be of value to society and other needs, as well.

To give you a little context in California specifically. You can see here from the numbers that roughly over the latter half of the 20th century we averaged about 100,000 hectares per year that burned. Last year we had a great year, if you're a pyrotechnic freak like I am, that we got a lot of burns going, although people in the central valley didn't appreciate the smoke. About 550,000 hectares burned.

But if you look at one of the estimates for historically how many acres in California burned, in the early part of the 19th century and before, the estimate is about 1.8 million hectares.

So currently you can see that each year that we go by, we build a more and more significant backlog in which we have a higher and higher biomass load developing in the forests. And we're getting further and further behind the curve in terms of this accumulation of fuels in the forest system.

Largely there's quite a number of ways that fuels are treated in California forests, but for the sake of a little bit of simplicity, although generally adherent to the way they work, they're kind of largely broken down into two type of categories.

One is the defense, or defensible fuel profile zone. These are the absolute anchor points in the landscape. And if you think about, for instance, Lake Tahoe where you've often got million-dollar homes, this is what you're going to put in right behind those homes to make sure that when a fire comes up over the hill you've got a really good chance of being able to hold it.

And those are zones in which fuels are really extremely reduced, both surface, ladder fuels and crown fuels.

But in the overall context of the landscape, they still don't amount to a significant number of acres. The bulk of the landscape out there is still in areas which are largely away from where urban developments are.

And the bulk of fuels treatments that are really debated and where the controversy comes from is what are called strategically placed area fuels treatments, known as SPLATs, for short.

And these really deal with those reducing ladder fuels, which is the means by which the fire can move from the surface up into the over-story or crowns of the trees, and then kill many of the trees. A very uncharacteristic fire behavior from what we would have had historically. As well as reducing the surface fuels.

And what I'm going to make the point at right now is that there's a tremendous amount of controversy about ladder fuels and how large of a tree we can thin. And I will get back to this issue about that question of diameter. But I want to say right upfront for fire ecologists and for people who study and know fire dynamics, the real action in these systems is the surface fuels.

We pay a lot of attention to what size of tree we can cut, but actually what drives fire intensity most of the time in these systems is how much junk you got on the forest floor.

And certainly after 100 years of fire suppression there's a tremendous amount of fuel load out there, slash, litter, that's accumulated over that period of time. And that radiant convective heat that develops from those things burning is what keeps the fire up in the over-story trees and really drives the crown fire.

You'll notice one of the figures here that the estimates, at least with modeling estimates, are that you need to treat at least 20 to 30 percent of the landscape before you're really going to slow down or knock down the fire enough to maybe move it back to a lower intensity fuel type of condition.

There's particularly a lot of, up until I'd say the last five years, a lot of anecdotal information. A lot of physical principles that would suggest why fuels treatments would work. But I'd say over the last particularly four or five years we now have some very good studies that have developed, and some very good empirical proof for the fact that fuels treatments do, indeed, work as you would expect them to.

Now, of course, all bets are off if you get really high winds, but it's becoming more and more difficult for people to argue that these things really don't work.

Now, how you carry them out is very important. It's very important, as I mentioned, again to reduce the surface fuels and not just focus on the ladder fuels. But, again, it's becoming very clear that these are very effective tools for reducing fire intensity.

So now I'm going to jump a little bit from that background and look at some carbon dynamic questions here, because I think that what we're going to see in terms of the results of how carbon dynamics play out in these systems actually support a lot of the push or the emphasis on trying to get biomass out of the forests. When biomass is removed in a sensible way that is, I guess, complementary to a lot of ecological processes that I'll mention here in a minute.

But first, what I want to talk about is if we look at forest growth, you've probably seen various figures out there for these, and how much forests might be able to sequester, offset the amount of anthropogenic emissions going on.

One estimate is 6 to 10. There's a more recent estimate that suggests more on the 10 to 14 percent range. I'm using the more conservative one here at this point.

But you'll notice that the amount of emissions are not equally distributed throughout the United States. The bulk of the emissions are coming from the west. Again, the area in which we have this real problem with fire suppression and fuel loads.

A couple premises that I just want to point out here that went into some of the studies I'm going to talk about here in a minute is that wildfires, in general, can release a significant amount of carbon. And the amount of that release obviously increases with fire size and severity.

So, the general objective would be to try to increase storage, how much the forest can hold on to, while reducing the risk of carbon loss due to wildfire. And in western forests that depend on frequent fire, you obviously can't just continue to grow trees and push more and more trees into the system.

It's a very risky proposition because eventually those forests are going to burn. And they could burn at very high intensity, releasing a lot of carbon.

So that you can't just make the argument that to just let the forest build up as much tree biomass as it can. And I'll talk a little bit more about that in a minute.

Forests need to be managed for more than carbon sequestration, and I'll make that point specifically here in a little bit. More emphatically, because that's one of the things that's really holding up our ability to remove biomass from the forest.

And I think that what I'm going to show is fortunately forest restoration and carbon management share a long-term objective, which is basically redirecting where carbon is accumulated in the system from what I would call leaky or flashy sources, which are the small diameter trees into much more stable pools, which, in forest systems, are the large-diameter trees, the fire-resistant trees, the large-diameter pines in particular.

The question is how to get there and what are the tradeoffs between different means of doing that.

This is a diagram, it's more a conceptual diagram. It has some of the tradeoffs that are going on here. And what I want to emphasize with this is that if you're looking at the blue line where you're looking at carbon storage presently in the forest, as you make the forest a little bit more fireproof, you're going to reduce that storage, of course.

Because you're either removing wood offsite, take it to the mill or burning it with prescribed fire. At the same time as you're doing that, you're increasing the resistance of the forest to high severity fire. So that there's tradeoffs that are going on between immediate emission releases versus buying yourself more security in being able to avoid high-intensity wildfire.

The next few slides are coming out of a couple papers that one of my old students and I have been working on, in which we looked at this question of tradeoffs.

And the first one here is a busy slide, so I'm just going to kind of synthesize it to give you what the real take-home message was.

We looked at how you -- if you treated the forest with different fuels treatments what would be the tradeoffs in terms of the amount of emissions, in terms of how much smoke you put out from prescribed fire versus how much emission you would have from the wildfire that would occur. And then finally, how much carbon you'd have stored.

And in this case we're looking at this with a scenario of over 100 years, using a modeling scheme. And putting the wildfire in the middle of that century.

The left-hand side of these graphs are having to do with different levels of thinning, control, an under-story thin, a restoration thin, and a reconstruction of what the forest looked like in 1865.

The right-hand graphs are the same treatments, but adding prescribed fire to them. And the height of the bars has to do with how much carbon there is in the forest. The dark blue is the live carbon, the light blue is the dead carbon.

The main point I want to make in this is that as you would expect, the forest, as it existed in 1865 when it burned frequently, ends up being the condition that is most stable, most resistant to emissions, high emissions. And actually releases the least amount of carbon, as well, even when you prescribe burn it.

So, you know, as we say about ecology, it's not rocket science. It's often the painful elaboration of the obvious. In this case, it's pretty obvious, but you would expect that a low density forest made up of large-diameter pine trees is, indeed, going to be a very stable storage of the carbon, as well as have some of the lowest emissions of carbon.

An interesting corollary to this was a second study in which we looked at -- the previous study was with modeling. This was with actual field data at a site called a teakettle experimental forest where we try different fuels treatments.

And one of the suppositions that people have had all along is, well, there's been a lot of negative consequences to fire suppression. But maybe we've got one benefit or one perk out of this lack of fire in the forest, is we would have crammed a lot more carbon into that. Because all those open spaces in the forest have filled in with trees. And because of that you would have packed more carbon into the system.

It turns out that that's not right. The main reason appears to be that over the years as the forest has gotten more crowded, we've lost the higher number of very large diameter trees we used to have in the forest. Which is what the very right-hand side of the graph here shows. These are paired bars showing 1865 on the left-hand side, and the current conditions on the right-hand side.

And if you look at the circle on the top that shows, it's in orange with a little red circle about it, that indicates the amount of carbon that's stored in that largest diameter class.

And in 1865 the amount of carbon stored in that largest diameter class was astronomically higher than what we've got in the forest currently.

And so that counterintuitively there's a tremendous benefit to actually trying to move the forest towards a lower density of trees if you end up with a lower density of very large pine trees. Because, again, those are very stable sources -- or very stable sinks for the carbon to end up in the system.

Just a couple quick slides. These have more to do with kind of the general where the carbon ends up in the system with these different treatments. You can see along the bottom axis the different treatments. 1865 on the left to going over to a very heavy treatment, an over-story thin and burn on the right-hand side. And the relative distribution of where the carbon ends up in the system with these kind of different treatments. With the red triangle being the amount of emissions.

So in a perfect world what you're trying to do is, of course, reduce the amount of, or the height of that red triangle, and at the same time get the live, green column as high as you can get it, so that you've got a fair amount of carbon stored in the forest in live structures, rather than the kind of leaky dead structures that snags and fuels are.

For a fire ecologist this is actually the money slide, which has to do with how risky the forest is. Fire ecologists break down the fuels into different moisture-hour classes, basically having to do pretty much with size.

And what you really want to do in this kind of a scenario is reduce the smaller, what's called the one-hour, the ten-hour, or the 100-hour fuels, because those are the things which really drive high fire intensity.

And you're probably beginning to see a

little bit of a pattern here. There's no one obvious treatment that buys you everything at once. But there are tradeoffs going on here.

And I would point out that the under-story thin and burn, which is the fourth from the left, ends up being overall, in terms of tradeoffs, the one that gives you the most bang for your buck. You really end up significantly reducing the threat of high-intensity wildfire severity, at the same time, without substantially knocking the carbon storage down that much in the forest.

So, in sum, basically what we've got here is kind of a system of tradeoffs in which you're looking at how much you're willing to emit immediately right now in return for buying yourself a reduced wildfire severity. And how you can kind of redirect the growth in the forest so that it packs carbon on into very stable structures.

And what I really want to emphasize is between all of this is that we have pretty decent estimates of where a lot of this carbon goes. Except for, I would say, currently wildfire emissions, which there's a lot of debate over how much carbon is released in the immediate wildfire event. As well as how much carbon actually slowly gets released from all the dead wood on the site that eventually gets -- decomposes into the soil. Some of it gets held in the soil as stable carbon. Some of it goes up in respiration carbon dioxide.

So why aren't fuels treatments more widely implemented? And there's really two main limitations here. One is economic viability, the treatments. And what we're really talking about in the Sierras basically is 20- to 30-inch trees.

Often if you can get the logs to get down the road to the mill, you can pay for fuels treatment to actually occur. Otherwise, it's frankly just not going to happen.

And particularly for forest ecologists it's not only not going to happen, but you're rarely going to get prescribed fire back into the system, which is how you really restore these ecosystems. You need fire back in these systems as much as you can get it.

The problem has been that once you start thinning those type of trees you cannot make the argument anymore that you're reducing it, you're doing it to reduce wildfire severity. The science, the modeling, the research just does not support the fact that a 20- to 30-inch tree has much of an impact on wildfire severity.

So, if you're thinning those kind of trees you have to have another argument for doing it. And there are some arguments for it in terms of ecological or ecosystem restoration.

But where we've gotten ourselves into trouble in some of these cases is using the argument that we're removing those trees to reduce wildfire severity.

Overall, though, the biggest, by far, limitation on fuels treatments has been litigation. And the litigation, most of the time, particularly in California, comes down to the lack of provisions for sensitive species. What's often referred to as TES, threatened and sensitive species, and the lack of provision for their habitat.

And part of the problem is that many of those species, including the three you can see here at the bottom, the left-hand one is the Pacific Fisher, which is the main species of concern in the Sierras now. Those, all three of these species, actually, are associated with very high canopy cover, higher stem density type of forest conditions. The very kind of conditions that make fire managers very nervous. Because, indeed, they have higher fuel loads.

So where do you place those kind of conditions in the forest to be able to accommodate those species and still be able to reduce fire intensity?

We've just recently come out with a proposal to kind of reconcile these two differences. And I don't have time, of course, to go into this. I do have a few copies of this publication if anyone's interested in learning more of the details.

But, in essence, the real crux of what it does is it says to produce variable structures and fuels that you would want in these landscapes, it would be most prudent to mimic the type of fuels and structure that low intensity fire would have done historically. And what changed fire intensity in these forests was topography.

And the beauty of this kind of solution is that it allows, particularly environmental groups, to know why you're doing something, and to go out on the ground and check it. And that level of transparency buys you a tremendous amount these days.

Rather than forest managers saying, you know, I'm a professional here and we know what we're doing. You need to have some way that groups can go out and check that you're actually doing what you say you're doing. And that they can see what the overall coordination of those different forest structures will be like on the landscape.

The funny thing about this is when I've given this talk to forest managers they immediately object, saying, we already do this. And exactly right. They do already do this.

The problem has been is that there has not been a scientific theory to ground the reasons for doing it in a context. And I think that's hampered the managers, even though the managers are actually practicing very prudent, often very good ways of manipulating structure and fuels in these forests.

Same kind of thing goes on, that last slide was stand level, this is kind of a landscape level in which, again, forest structure to the fuels are varied by topography. Mostly slope position aspect and slope steepness.

What about this thinning of merchantable trees? Well, the thing about the topography is it actually gives you some guidelines as to when you would take 20- to 30-inch trees out of the forest, and specifically what type of trees you would take out, which is predicated first on species, the ones that have filled in with fire suppression. And then next off, topographic location.

Again, that these forests and mid- and upper-slope conditions would have a low density of pine-dominated structure historically if they burn frequently to fire. And so those are the very conditions, those are the very places you could take out this merchantable class of trees and still be able to produce a structure that would be compatible with wildlife needs and meet the needs of fuels reduction, as well.

So how did the environmental community respond to this? We're actually kind of fortunate in California that particularly we've got one group that serves as kind of an umbrella for many other groups out there, the Sierra Forest Legacy.

And they have strongly endorsed this procedure, basically buying onto it to the extent of saying that this is the first time they've seen a management procedure in the Sierras over the last eight years that they would strongly support and feel comfortable about implementing.

So, in summary, just a couple final wrap-ups here. Is that forest biomass removal has many ecological benefits for the forests. I don't think any of us would deny that in terms of reducing wildlife severity, increasing forest carbon storage, and a lot of ecosystem restoration benefits that I couldn't go into.

However, to really have this done on a large scale means that fuels treatments have to be widely done. And the treatments have to be economically viable, which means that you have to thin larger size trees. And the thinning of those trees does not affect wildlife or wildfire severity. And the thinning of those trees potentially may be reducing habitat conditions for sensitive habitat.

What we've tried to do here is present a kind of conceptual model that may be able to reconcile some of those things and use topography specifically to be able to guide forest management, use it as a template. Which, in turn, buys you a fair amount of cooperation because it really allows for a fair amount of planning transparency, saying why you're doing certain things in certain places. And it allows people to go out onto the ground and actually verify that what you say you're doing is what you're actually doing.

Thank you.

(Applause.)

DR. KAFFKA: Thank you. Any comments or questions?

Please give us your name.

MS. BLEIER: Cathy Bleier with the California Department of Forestry and Fire Protection. Does your -- I haven't seen the paper, the report -- does it take into consideration how climate change, itself, is going to affect these mid- and longer term management strategies and implementation?

I mean the question is what's going to be a desired condition. Is the 1865 condition going to cut it, you know, 50 years from now?

DR. NORTH: It's a great question and it deserves about a five-minute answer, which I won't give you. But the essence is yes, the paper does go into a fair amount of that.

And as I'm sure you're aware, forest managers have been in kind of a quandary because up till recently we often used 1865 or pre-European conditions as the model for how to do forests.

Now a lot of times what scientists are saying we need to hedge bet and be able to make the forest resilient. And to be able to make it resilient, we still use those pre-European conditions to give us general guidelines. But we don't try to stick to them hard and fast in terms of we need eight trees of this size, and so forth, on it.

So that there's a movement to use that as a little bit of a guideline, but at the same time to try to move forward to make the forest resilient to increasing perturbations, particularly of climate and wildfire, which is supposed to be predicted to increase both in severity and frequency.

DR. KAFFKA: Thank you very much.

(Applause.)

DR. KAFFKA: Our next speaker is Dr. Howard Levenson. And he's currently the Director of the Sustainability Program, very appropriately for our session, at the California Integrated Waste Management Board.

He has been the Advisor to Board Member Paul Relis from 1991 until 1998. And he served as Supervisor of the Organic Materials Management Section at the Waste Management Board until May 2003. And then was Deputy Director of Permitting and Enforcement until May 2007.

He worked with the U.S. Congress in the Office of Technology Assessment for a number of years. He's written a book that's of interest called "Facing America's Trash, What Next for Municipal Solid Waste." That's now several years old, 1989, but I'm sure it's widely used.

He has a BS and MS in natural resources management from Humboldt State, and a PhD from the University of Kansas. And thank you very much.

DR. LEVENSON: Thanks very much. It's a pleasure to be here at the Forum. I want to acknowledge Rob and Martha and all the other folks who work behind the scenes to put this together. I know there's a lot of work that goes into putting this on every year. So, it's a pleasure to be here.

And what I would like to talk to you about today, some of the things that you've already heard about yesterday related to municipal solid waste, and sort of tie those together and talk about sustainable use of biomass from solid waste. What are some of the opportunities and some of the barriers, and what are some of the environmental issues.

I think, and I'll apologize to you, this is a slide from Rob, I believe, or at least from the Collaborative, so some of the things some of you have seen before. Those of you who have seen this stuff before, bear with me. But hopefully this will piece together some of the ideas and issues that are going on with solid waste.

This basically just demonstrates that there's three main sources of biomass in the state of California. Obviously forestry, ag and solid waste. They're large resources.

And when we look at the solid waste stream, what you've got here is a graph that shows a number of different things. First of all, we basically generate about 90 million tons, over 90 million tons of solid waste every year.

And if you look at the top line, the top blue line, that's the amount of tons that are disposed over the last 20 years. You can see it's relatively flat. It's roughly 40 million tons a year.

If you look at the diagonal line that's going up, increasing over time, that's the amount that represents the diversion rate, how much of that generation has been diverted.

We started off at about 10 or 12 percent back in 1989 when the Integrated Waste Management Act was passed. And now we're at, as of 2007, an estimated statewide diversion rate of about 58 percent. So, you know, roughly 55, 60 million tons are being diverted; 40 million are still being disposed.

Population's gone up at the same time, so generation's gone up over time. So really what we've been able to do over the last 20 years, all the investments in recycling programs and infrastructure, is really keep up with that generation, that increased population. So we've still got 40 million tons a year going into the landfill.

Now, that might dip down a little this year or next year because of the economic downturn, but overall that's not going to change too much.

What's that 40 million tons composed of that goes into the landfill? Well, about 70 percent of it, based on some of our waste characterization studies, is carbon-based materials.

Roughly 30 percent is compostable organics, things like grass, woody material, brush and the like. Another 20 percent is paper. Roughly 15 percent is food waste. And then there are plastics and carpets and other things that have some carbon base in them.

So, recognizing that this is a huge resource that is really going untapped, the Waste Board adopted in 2007 what we call a strategic directive. It's really a goal that we have; it's not anything that's mandated in statute.

Unlike the mandates that every local jurisdiction has to get half the material out of landfills, this is more of a Board objective over time. We would like to see movement towards getting at least half the organics that are going into landfills, half of those compostable and carbon-based organics that are still going into landfills out of the landfills by the year 2020.

So, what does that mean? It means we're really going to have to find a home for roughly 15 million tons, give or take, of material every year, solid waste material.

And that might be exacerbated. There might be a need for even more infrastructure development if the 3 million tons a year of green woody materials that are chipped up and used as what we call alternative daily cover in the landfill. If that policy is no longer in place and people don't use that material as alternative daily cover, we're going to have to find a home for that, as well.

Now, there's -- well, in order to get to 15 million tons of new infrastructure we're probably talking on the order, and there's all kinds of back-of-the-envelope calculations, but you're talking 50 to 100 new facilities around the state to handle that. Depends on the size, of course, and through-put on a daily basis. So you can do all kinds of different permutations of that. But we're really talking about developing, siting new facilities and developing a major new infrastructure.

So the challenges, you probably heard about some of these yesterday in the talks on some of the L.A. projects and the Bluefire project, there are many challenges. I want to talk about some of those before I talk about some of the opportunities and some of the new policy drivers.

They fall into roughly these three categories. There's probably other ways to categorize this, but, you know, siting issues, statutory and regulatory issues, and funding and economic incentives.

On the siting side, no surprise, siting facilities of any kind is very difficult. The second bullet up there references something called a siting element. In the arcane world of solid waste planning, every jurisdiction or every county has to have what's called a siting element, where they plan out what the facilities are going to be for them to meet their diversion requirements. And especially they have to show that they have 15 years of capacity at landfills for disposal.

There's nothing like that for diversion facilities. There's nothing that says you have to be able to show that you have 15 years of capacity available in your county or your region for being able to move these kinds of materials into processing, recycling and beneficial use. So there's not much that pushes kind of regional planning and regional approaches to this use.

There's also the, you know, the constant NIMBY, not in my backyard, of siting any facility. And there's also the fact that the Waste Board, when AB-939, the underlying statute for solid waste management was passed in 1989, there was a definite separation of authorities between local governments and the state government in terms of who makes the final decisions about the siting of facilities.

It's a local land use decision. The Waste Board is involved in reviewing the environmental documents and making sure that when there's a solid waste facility involved that the facility meets various state standards. But we do not get involved in approving a specific site that's selected, and approving say the conditional use permit or any local zoning or permitting issues. So it's a local issue.

I could talk on and on about siting; it's always going to be a problem.

Now, there's a number of statutory and

regulatory issues that you probably heard some of this yesterday. Of course, one of the biggest ones that we've talked about for years is the statutory definitions related to, particularly to transformation. That's a term of art, but it's defined in the Public Resources Code.

And to another term that was put into the Public Resources Code about four or five years ago, called gasification. The way those definitions are constructed, basically means that any type of waste-to-energy facility or gasification facility, pyrolysis facility, they fall into these categories. And because of the way they're constructed, they count as disposal.

And that's very significant to jurisdictions and to many businesses who are looking at siting new facilities, especially the ones that fall in these categories. Because remember I mentioned AB-939, the Integrated Waste Management Act, says that you have to divert 50 percent of your waste that's going into landfills from the landfill.

Well, a landfill is disposal. If a transformation facility or a gasification facility counts as disposal, and you shunt material into those kinds of facilities, it doesn't count as diversion.

So there's a reluctance on the part of many jurisdictions to invest or investigate the use of these kinds of technologies because of that statutory definition and that constraint.

There's been, as some of you in the audience can attest, there's been many bills that have been run on this issue. At least five or six in the last five or six years running, there have been bills to try and address this. And they have not gotten out of the legislature yet. There's another one this year that's being looked at.

So, this is a major barrier. The Collaborative has, you know, talked about this and tried to deal with this for years, and many people have. So it remains a very critical barrier.

There are also, and I'll talk a little bit more about this in the next couple of slides, there are inconsistencies and/or contradictory goals in terms of what some of our sister agencies do in treating organic materials. Particularly the air districts and some of the regional water boards. And I'll come back to that.

And then another regulatory barrier that some perceive as being important is the Waste Board regulations, themselves. For example, we have a requirement that if you take food waste and you most likely are going to have to have what's called a full solid waste facilities permit. And that's another layer of requirements that have to be dealt with and addressed before you can get the okay to go ahead and take food waste.

We also do not have real clear definitions or guidelines on how to permit or deal with anaerobic digestion.

So we are in the process of reviewing our regs, but those still remain issues that haven't been resolved yet.

Some of the cross-agency issues that I mentioned, this is just a list of some of the initiatives that we have dealt with over the last five to eight years. Most of them started with some of the South Coast AQMD initiatives related to biosolids composting and co-composting with green waste.

We've seen a series of regulatory proposals from other air pollution control districts or AQMDs, and then we've also seen some proposals from regional water boards.

So let me talk a little bit about air emissions first. Why would air pollution control districts be concerned about composting operations? Well, primary -- there are several reasons, but the primary one is that composting operations do emit some volatile organic compounds. There's no question about that.

How important those volatile -- those VOC emissions are relative to other sources of VOCs is an issue of concern to the Waste Board. But there have been concerns about this because the VOCs react with nitrogen oxides and sunlight and they'll create groundlevel ozone. Groundlevel ozone, of course, has got health implications and criteria pollutant, under the federal air act, and so the air quality management districts, especially ones that are in nonattainment areas, have to deal with VOCs because it's a precursor to ozone formation.

In part, to deal with some of these concerns and to help the air quality management districts formulate more scientific-based regulations to deal with these, the Waste Board has sponsored a number of studies on VOC emissions.

There's one that was completed about a year ago. We call it the Modesto study because that's where it was done. And it showed that about 70 to 80 percent of the volatile organics are emitted from a traditional compost operation. Which, if you're not familiar with it, it's sort of a long pile. Usually it's a triangular shape, six to eight feet tall. And the materials are decomposed biologically in that. But that's, we call it a compost windrow.

About 70 to 80 percent of the VOCs are emitted during the first couple of weeks. And most of them come out through the top of the pile.

We also found that when you add in a portion of food waste, 15 percent in the case of the study, that increased the amount of VOCs being generated during the first couple weeks.

So we were looking also, wanted to quantify that and seeing just what was exactly coming off the pile. But also to look at are there management practices that can be employed to mitigate those emissions.

And we did find that capping the pile with a pseudo-biofilter sort of a compost cap would help cut down the emissions during the first couple of weeks by roughly three-quarters.

So we continue to do more work on that area. But those are the kinds of pieces of information that the regulatory agencies need in order to develop a more science-based and more flexible approach to regulating these kinds of operations.

Now, on the water quality side, there are really two primary issues. The one that we deal with mostly are concerns about salinity. Stormwater runoff from a composting operation or things leaching off of a compost pile and carrying dissolved salts and other, you know, components into groundwater or surface water.

So, as a result of that there have been proposals by several regional water quality control boards to impose fairly prescriptive standards and requirements on what we call green waste composting operations.

And under the Water Code, if they are dealing with individual facilities, typically they would be regulating them under Title 27, that's the code that they work under. And those standards are really kind of landfill standards. Double liners, concrete pads, intensive groundwater monitoring and the likes. It's a very expensive proposition for a composting operation, which is a marginal operation in most cases, to meet those kinds of conditions.

So in response over the last few years we have been trying to work with the state water board and the regional water boards to develop a statewide general order that would establish more of a tiered set of requirements.

So, that if you are in an area where there is not greatly impacted groundwater, you're far from the source of groundwater, and you use certain kinds of bin management practices, you wouldn't have to go to those landfill type of permit requirements and the expenses that are involved in that.

We're not there yet. We have finally gotten to the point where we're going to have some general public workshops on this issue, co-hosted by the state water board, and we're hoping that over the next year or two you can come out with a flexible, performance-based statewide approach that the regional boards would then adopt.

It would allow composting facilities -- they still would have to meet water quality objectives, but they'd have a more flexible performance-based approach that they could use to get to those objectives, rather than having to invest the monies in very prescriptive, and in some cases unnecessary, operation and design requirements.

So, as I mentioned, we are working with the state water board staff on this statewide approach. At the same time we're continuing to do research on compost best management practices.

We're working with Caltrans. Caltrans has adopted some specifications on compost use in various situations. So we've got about ten workshops going on around the state right now to try and convince public works officials and Caltrans district managers to use compost in certain situations for erosion control and roadside vegetation and things like that.

The final category of major barriers that I wanted to briefly mention was really funding and kind of economic incentives.

Landfilling of organic materials and the use of green material, chopping it up and using it as an alternative daily cover, is pretty cheap in this state. It's costs about $30 a ton to move something to a landfill.

It's generally less expensive than moving that material to a composting operation or to, what I have up there is AD, to an anaerobic digestion facility of the like. It's simply it's more costly to handle that material for composters. Composters can't charge much for getting that material because they run the risk of then being undercut by nearby landfills.

So the underlying economics of landfilling in the state, I think, is a very critical barrier. And especially when you compare it with back east. Landfills back east often cost over $100 a ton to get to dispose something in a landfill. So it makes the relative economics of other options much more viable. In California the cheap landfilling just undercuts the economic feasibility of other options.

We also don't have a great dedicated source of financing to fund R&D or demo projects or various programs related to organic materials. The Waste Board is a special fund agency. We have a lot of money for tire recycling; we have a lot of -- we process or are responsible for all the payments related to ewaste recycling. We have a special fund for used oil recycling.

And we have zero monies that are dedicated to plastics, paper, organics, construction and demolition debris. What else am I forgetting? But the 95, 90 percent or so of the waste stream and most of what is, you know, the organic fraction that's going in the landfills.

So it's very difficult for us to really foster a continuous dedicated research effort or a RD&D grant program for pilot projects or anything like that. We've done what we can with some of our contract dollars over the years, like the Modesto study, and some of the other things I'll mention later. But those monies, they go up and down, and they're very discretionary in nature.

So, that's sort of the bad news. We fight it, keep working on it.

What does the current infrastructure look like for handling organic materials from solid waste? We've got about over 200 facilities that either chip and grind materials into a mulch, or they compost it, go through more intensive process and compost it into a soil amendment or some other kind of product.

And they handle about 5 million cubic

yards of material, produce about 5 million cubic yards of compost and mulch per year. Depending on densities, conversion factors, it's probably about 10 million tons of organics every year.

So remember, I said we probably had to develop an infrastructure for about 15 million tons a year, an additional infrastructure. So we're not even half way there on the infrastructure that's needed. And it's difficult to site new facilities.

We also have the traditional biomass facilities, the hog fuel facilities. There's roughly a couple dozen that are still in operation around the state. And they also can take certainly some of the drier woody materials. And they use that for producing fuel.

One of the themes of today's conference, of course, is some of the environmental benefits or environmental impacts. And there's a lot of benefits associated with compost use.

It's difficult to quantify these. You can read the slide. I'm not going to run through these. But it's clear that composting piles give off some odors, but there's a lot of mitigating factors, a lot of compensating factors.

And I think if you just look at the agriculture, for example. If we can keep composting facilities open and use composting in agricultural applications, to the extent that compost has some nutrient value, it's going to hold water more, it's going to improve soil health. It may reduce the need for ammonium nitrate fertilizers.

And when you do that, you're doing a lot of things that are beneficial to the environment. You're reducing N2O emissions from the use of those fertilizers; potential nitrate problems with water.

And then you think about what it takes to produce synthetic fertilizers in terms of all the energy inputs back at the factory. We'd be replacing that embodied energy in those nitrogen fertilizers with compost. So there's a greenhouse gas benefit that's associated with that, as well, because you won't have the energy use to make the fertilizers.

Of course, this is part and parcel of the AB-32, the global warming act, and the scoping plan that was adopted by the ARB, the Air Resources Board, just last December.

The Waste Board has about six or seven different measures in the scoping plan for which we're responsible for implementing over the next few years. The plan, as a whole, of course, most of you know, targets greenhouse gas reductions to get them to 25 percent -- reducing 25 percent by the year 2020. And further reductions by the year 2050.

There are many things that are involved in the scoping plan that touch on organics. There is a landfill methane capture measure. The Air Board is adopting a regulation on that, and I can't remember the date, but it's imminent, to impose more landfill gas collection and capture systems at some of the small- and medium-sized landfills around the state.

We have measures that are in the plan that are relating to increasing composting. Also to increasing anaerobic digestion.

Now, I've been talking a lot about composting. As you well know, there's a whole set of other technologies that could be brought to bear on this issue. And they are sometimes called diversion technologies; sometimes they're called emerging technologies. Depends which politically correct or incorrect term you want to use.

But they are basically a suite of technologies that range from high temperature ones on one end of the spectrum, things like gasification and pyrolysis, which I mentioned a little bit in terms of the statutory issues, to lower temperature, more biologically based processes like fermentation or anaerobic digestion.

And we have a very loose definition in here of non -- these are noncombustion technologies. They're not your mass burn incinerators. They can use materials that the recyclables have been pulled out of, use those to produce alternative fuels, if I could spell it right, energy and other kinds of products.

I talk about a little bit on the statutory barriers for gasification in particular, and pyrolysis. There's, you know, quite a resistance to allowing those kinds of technologies to be used for these purposes. And as I said, there have been bills run in the past, and there's another one, 222, is it AB or SB? Ab-222 this year, that is trying to address that issue.

On more the biochemical or biological

side of things, the two primary technologies are anaerobic digestion and fermentation. You know, kind of using fermentation using organics to produce an ethanol fuel. And you heard from Necy yesterday about the attempts to get Bluefire going in southern California.

So what kinds of operating facilities are there that cover the spectrum of conversion technologies? On the sort of biochemical, biological side of things, there are literally, there's well over 100, probably close to 200 now, anaerobic digestion facilities in Europe that handle some fraction of the municipal solid waste stream.

In terms of gasification and incineration, this is much more common in Europe and in Japan. And you'll note that I don't have anything there about any facilities in the United States.

So there's no anaerobic digestion facilities that really, in the United States, that handle anaerobic digestion on a large -- anaerobic digestion facilities that handle solid waste on a large scale. There are no gasification facilities that do that. Yet those are common technologies either elsewhere in the world or for using in other feedstocks.

A couple years ago -- I want to jump to some of the research that we've done, and partly acknowledge my colleague in the back, Fernando Berton, that many of you know, and I'll wrap it up. Again, I'm getting the hook.

There's a whole series of slides here that show some of the benefits. We did a study that compares various emissions from landfilling versus waste-to-energy versus a set of the thermal technologies, the gasification and pyrolysis technologies. And I'm just going to quickly run through these. We can follow up later.

But they basically show that the conversion technologies provide a net environmental benefit in terms of energy, NOx emissions. The NOx emissions can meet statutory and regulatory standards. Same thing for lead. There's a whole series of these in various reports. Also for dioxins and furans.

Yet, particularly the thermal technologies are still an issue. There's a lot of people who think they are incinerators in disguise. They feel that the promotion of these kinds of technologies will harm the existing recycling infrastructure. There's permitting issues, you know, should they be considered solid waste facility or should they be considered a manufacturing facility and not be subject to permitting and costs and NIMBYism, as well.

I'm just going to skip on. Regardless of all of that, I think it's safe to say that we've got a huge potential here.

If you took these materials, and there's various estimates, but you could displace the, you know, tens of millions of barrels of crude oil every year. We could produce thousands of megawatts of electricity. So there's a huge potential there.

And the rest of my talk was going to be, and I'll just quickly run through, some of the drivers that are currently in place. And I think you're all familiar with these.

There's the renewable portfolio standard, there's the executive order from the Governor to promote biofuels and bioenergy, which is one of the Collaborative's main focal points. A lot of instate production.

There's the low carbon fuel standard

that was just adopted by the Air Board and we'll be working with them to incorporate both increased landfill gas-to-energy and fuel projects, as well as a pathway for anaerobic digestion facilities to qualify for low carbon fuel standard provisions.

There's the Energy Commission and its transportation fuels program. AB-32 greenhouse gas reduction goals. And stimulus money from the federal government. We're trying to figure out ways to help folks tap into that money. It's kind of a very difficult pathway to follow and find out where the pots are, and who's in charge, and what application is due what day. But, you know, we keep trying.

A lot of Waste Board activities that are ongoing that are all related to this. We have a variety of studies on lifecycle and economic analysis of organic materials management options. We have a couple of demo projects. One's at UC Davis that we've helped support over the years on anaerobic digestion. We have another one up in Woodland that is going to look at a small-scale gasification plant.

We've just adopted or approved a contractor to conduct a programmatic EIR for anaerobic digestion. This is not trying to replace the CEQA requirements for a site-specific project, but to try and provide an underlying base of environmental information that will help speed that process along.

And you can see there's a number of other activities that we have going on.

So I think I'll just stop there. I've gone on too long. And I will thank you, and I'd be happy to answer any questions.

(Applause.)

DR. KAFFKA: We'll take one question (inaudible).

MR. STANGL: One quick question. I noted with real interest your advocacy for the use of some of the materials. But I wonder, with the Department of Transportation and things like that, I wonder if you're doing any advocacy with the LEAs, or the local enforcement agencies, to say, hey, some of these conversion technologies are a great thing, you should consider them?

DR. LEVENSON: Local enforcement agencies, the LEAs, as the gentleman references, if you don't know that, those are the permitting arm, if you will, for the Waste Board. They are responsible for the actual issuance of a solid waste facilities permit.

And, yes, indeed, we have an annual LEA training conference. And we've had sessions on conversion technologies. Fernando has spoken, and brought in other speakers. Because we've been trying to education them about that range of technologies.

We also put out a guidance document about a year ago, maybe, sometime in the last year, to the LEAs on given the current statutory framework and the current regulations, here are tips on how to assess those kinds of technologies and field your way through the regulatory morass, if you will.

And any time there's a proposal from a proponent, our legal office and our technical staff work with the LEA and the project proponent to better define that project, make sure everybody understands, you know, what it is and where it fits within the regulatory structure. So, if there are hoops to go through at least you know what the hoops are.

DR. KAFFKA: Thank you. My new thought about solid waste field, this is an underappreciated biomass. I think it's a very exciting opportunity.

Our last speaker before we take a brief break is Jocelyn Tutak. I hope I said that right.

MS. TUTAK: Yes, you did.

DR. KAFFKA: Thank you. Jocelyn is a conservation biologist and a geographic information systems analyst at the Conservation Biology Institute. I think that's based in Oregon.

MS. TUTAK: Um-hum.

DR. KAFFKA: At CBI she works on a variety of conservation planning and ecological assessments. And most recently she's partnered with NRDC, which has supported her coming here, which I want to thank them for doing, to evaluate the impact of critical ecological values on forest biomass projections in California, and also the southeastern U.S. Jocelyn.

MS. TUTAK: Thank you. So, just as a brief background. The Conservation Biology Institute is a nonprofit organization that provides science-based expertise in support of the conservation and recovery of biological diversity through applied research, education, and planning and community service.

We use GIS and remote sensing to conduct research assessments and planning in support of conservation projects globally.

Most recently we worked with the Natural Resources Defense Council to understand the effect of incorporating ecological considerations into biomass projections.

So, as you all know, California has significant forest and -- biomass resources, and is also home to some of the most biologically rich and diverse areas in North America.

As a leader in sustainable energy initiatives there's a lot of drive behind developing biomass resources here. However, any biomass development in the state really must consider ecological values as part of a long-term sustainability strategy.

Towards that the fire and resource assessment program, or FRAP, of the California Department of Forestry and Fire Protection conducted an assessment of forests in trouble and biomass resources in California for the California Energy Commission to evaluate the distribution and potential quantities of biomass that can be used for energy production.

In their report they used some ecological restrictions on biomass availability. However, NRDC was interested in the effect that additional ecological values would have on these biomass projections, and asked CBI to review that FRAP CEC report.

So as some background, the FRAP report considered several different categories of forests in trouble and biomass. Since we based our study on their report and findings, an estimate. It's important to understand some of the distinctions that they make.

So of all forest biomass resources in California they divided it into two groups. Merchantable and non-merchantable. Merchantable is saw logs, pulp wood and veneer, resources that already have a market. And non-merchantable biomass, which is thinnings, slash and mill waste.

Technical biomass exists outside of the report's environmental and administrative restrictions, which I'll get to in a second. There are further divisions, but I'm going to be focusing on that technically available, non-merchantable biomass, the biomass that can be considered most readily available for energy.

So these are the wood FRAP limited to technical biomass to areas outside of steep slope, 200-foot stream buffers, coastal protection zones, coastal sage scrub habitat and some protected areas.

And to quickly illustrate, this is gross total tree biomass in California. You can see the high values up in the north coast and along the Sierras and then disappearing in the central valley and down to the deserts in the southwest.

On the same scale this is the portion of that forest biomass that is considered to be non-merchantable. And then here's the non-merchantable biomass in those technically available areas.

There's a similar division in shrubland biomass potentials, only all of it was considered to be non-merchantable. So here's the gross shrubland biomass. And then, again, here is where it's technically available.

So I'm going to talk about two aspects of our work. We analyze the effective conservation values on biomass projections for the entire state, as well as each county and ecoregion.

We then wanted to understand the effects of resolution on these results, particularly with hydrological data.

So, in this first step the bulk of the analysis, we identified five ecological and administrative areas of conservation value, and calculated the biomass that was contained within these areas.

For potential old growth forest areas we modeled these from existing vegetation data by selecting for old growth traits such as older, uneven aged stands dominated by large trees in a multi-layered density canopy, which is quite a mouthful.

Additional old growth data created by the Sierra Biodiversity Institute was used in the Sierra Nevada where the existing vegetation data was particularly limited.

We looked at critical habitat, which is defined by the Endangered Species Act as areas essential to the conservation of the species, and may require special management considerations for protection.

We selected four species, the northern

spotted owl and marbled murrelet in the north, and then the desert tortoise and the peninsular bighorn sheep in the south.

We also looked at focal species. We took these from state habitat data. For two species, the peninsular bighorn sheep and the desert tortoise, this data served to supplement critical habitat data. And for the San Joaquin kit fox, a federally listed endangered species, critical habitat wasn't publicly available. So the state data stood in for them.

We also looked at Forest Service and BLM lands, which have been the focus of much discussion on forest biomass removal. They're excluded under the renewable fuel standard and there's concern about the commercial scale impact of biomass thinning and removal on ecological values. So we looked at each of these areas of high conservation value individually, as well as together.

And we also considered the wild and urban interface, or the WUI, which is a special case. It's the area where structures and other human development meet or intermingle with undeveloped wild land.

In this interface the likelihood that wild fires will threaten structures and people is greatly increased. And therefore, it's often targeted for fire abatement prescriptions, including the thinning of dense overgrown vegetation. These areas will likely be considered for fire fuel treatment activities regardless of the conservation values contained within them. And so we therefore identified the areas within that WUI and placed them back on the table, so to speak.

I apologize for the extremely small font up there. So conceptually, it's a straightforward process to calculate the biomass contained within these areas of high ecological value. Sorry about that.

For each of those five conservation values we calculated the forest biomass within their boundaries and compared that to the total forest biomass in the state, as you saw, and now will see again.

On the left is the total technical non-merchantable forest biomass projected by that FRAP report. A little less than 350 million bone dry tons.

The technical non-merchantable biomass that fell within our five constraints ranges from less than half a percent for focal species, to 45 percent under the USDA Forest Service lands.

These values aren't additive, since many of them overlap. And so we looked at two combinations of these values, the three ecological values together, and all of the values combined. Those three ecological values combined contained 21 percent of that original forest biomass estimate. And the total, all of the values combined, contained 54 percent.

And that 54 percent can be broken down further into its WUI and non-WUI portion. So combined, all of these values contained over 180 million bone dry tons of that technically available non-merchantable biomass. And 5.5 million of those tons fell within the WUI, where forest biomass removal can be integrated with fire fuel treatment prescriptions.

So ultimately that 54 percent is reduced to 52 percent, leaving 48 percent of that original FRAP biomass estimate potentially available for extraction.

And this signature will change for

different areas. So here's a map of the study area delineated by county, showing the amount of biomass contained within that roll-up of all conservation values. The darker counties contain more of the affected biomass.

The combined values in the north of the state and along the Sierras contain large amounts of technical non-merchantable biomass with Siskiyou, Trinity and Plumas Counties containing the most.

We can also look at the percentage of projected available biomass within those constraints.

Where the distribution changes slightly. Here are the darker counties. In the darker counties is a larger proportion of technical non-merchantable biomass is affected. A greater percentage of the technical non-merchantable biomass is in Trinity and Plumas, as well as Del Norte, Glenn, Sierra and Madera. And, again, I'm from Oregon so I apologize if I'm mispronouncing any of those counties.

These maps are aggregated to the county, and site level details can be overlooked. For example, those high values along the eastern border are largely because of the relatively very small amounts of biomass that are in those counties. And they are contained within those ecological values.

These maps can be particularly helpful in informing the planning of operations in low conservation value high biomass areas, the white to green counties. Avoiding environmental risk and moving the industry not only towards sustainability, but efficiency.

We repeated that process with the shrubland biomass where we see a different signature. The FRAP study suggests that over 60 million bone dry tons of shrubland biomass are available for biomass extraction.

Here, the largest single effect on technically available biomass is BLM lands, which contain 27 percent of that biomass. And here, too, the focal species and critical habitat, which cover a lot of shrubland area, account for higher percentages of total available biomass than in forests.

So, all combined, these values contain 57 percent of that original statewide shrubland estimate. And we can break that down again into total affected biomass -- excuse me, we can see the WUI lands had very little effect on the biomass in this part of the analysis. And that only 44 percent of the original FRAP shrubland estimates remain available for extraction.

Again, those numbers can be broken down by country and ecoregion, and we can see their distribution with the majority of affected shrubland in the south and the west of the state.

So, one concern that we had about the original analysis was the scale at which it was undertaken. We were concerned it wasn't fine enough to capture all of the detail that occurs at the scale of implementation, and would affect future implementation of biomass development.

And this would be most obvious in the riparian buffers. At a broader scale, a relatively straight river at a larger scale has a lot more bends and branches than a finer one. And buffering the two would capture very different areas. And therefore, different biomass estimates.

So to understand what sort of effect this might have, we compared the areas of buffers created at two different resolutions, 1-to-

100,000, which approximated the scale of the FRAP analysis; and 1-to-24,000, which is closer to what would happen at the scale of implementation.

Because the finer scale data is not available for the entire state, we selected equal areas within Forest Service boundaries in three different ecoregions, since they vary considerably in topography and hydrography.

So be clear, we used the hydrologic data within Forest Service boundaries, even though we'd removed them from the biomass in our original analysis, simply because that's where the data is available.

So we can see a small area from Mendocino National Forest. The 1-to-100,000 buffer is in the light blue. And the additional areas captured by the 1-to-24,000 scale data are in the dark blue.

Here's Lassen National Forest. And when we look at El Dorado National Forest in the Sierras we see a pretty significant difference between what each scale captures.

At a broader scale, the rougher scale analysis captures from 28 to 75 percent of the area captured at the finer scale. So at this broader scale, less high conservation value biomass would be identified than actually is on the landscape. And this difference is important when translating the results from report to implementation. This is a particular problem when implementing the northwest forest plan.

This is another example of how site level details can change projections created at a larger scale.

So, what we've done here is taken a good first step towards easily identifying conservation values and their effect on biomass projection. It's a process that's easily repeatable at different scales and for different combinations of values.

We must be sure to understand the difference between the scale of the study and the scale of implementation, and how that difference might affect biomass and conservation value projections. And we must be aware of locally important values that are not easily mappable at a larger regional scale.

And finally, biomass energy shows some promise as a clean renewable and domestic alternative to fossil fuels, but it can really conflict with critical ecological values and sustainability goals if not properly planned for and implemented.

Existing projections of available forest and shrubland biomass haven't adequately taken these values into consideration. And we really have to take them into consideration and avoid degrading them to reach toward ecological sustainability.

And that's it. Thank you.

(Applause.)

MS. TUTAK: Again, we'd like to thank NRDC for funding this report, and for making this talk possible.

DR. KAFFKA: Comments?

MS. BLEIER: Did you allow for any management or any management at all in the areas with the focal species, the sensitive areas? In other words, are you assuming that given everything we've heard about the changes in the forest structure and the fact that some of these places are overly dense and have fewer big trees as a result of fire suppression for 100 years, did you allow for any kind of -- you know, did you modify potential management?

Or did you just exclude any kind of management and thus any kind of extraction from those areas?

MS. TUTAK: So our analysis was based primarily on those values. So we didn't look into management strategies. So it was a pretty sort of cookie-cutter analysis. But mostly what we were interested in was just seeing what values were there that needed to be accounted for.

MS. BLEIER: Right, but you said it reduced the available biomass by half. So that assumes you just took it completely out of the --

MS. TUTAK: It reduces the available biomass estimate by half, and I think -- this report came up with their number, and so we just looked at these additional ecological values, just like they did. They just sort of took these stream management zones and protected areas off the table. And so we did the same thing solely to understand, you know, that biomass value that's underneath of those areas.

So we didn't look into what would be a further analysis of management prescriptions. Like I was saying about sort of site level issues.

MS. BLEIER: Okay, thank you.

MS. FALL: Carol Fall, and I'm actually from Trinity County. So I think this is kind of the same question. So if the net result of this kind of valuation becomes that you don't want to extract biomass to such a high level in these counties that have high conservation values, then how do you take the next step in your evaluation and say, well, if you didn't extract the biomass and you have more catastrophic forestfires, or you have a long-term forest that's a bunch of little stems instead of big trees, how does that play into your conservation values?

MS. TUTAK: So I think that's going a little bit further down the road of our initial analysis. I don't mean to sound like a broken record, but ours was really to look at these values and to see what biomass was underneath of them, and be able to consider them in a long-term sort of strategy.

But as for further recommendations in terms of policy and management, that's sort of beyond the scope of what we were asked to do.

MS. FALL: Thank you.

DR. MORRIS: Hi. Gregg Morris of the GreenPower Institute. I'm curious. You're looking at excluding lots of tracts of forest land. Are you aware of biomass harvest ever having caused the kind of problems that you're trying to avoid?

MS. TUTAK: Personally I am not. I think the parallels with extraction for lumber and pulp wood, I think, is where this is coming from. But again, I'm not personally aware.

DR. MORRIS: Okay. Well, I would submit that, in fact, they're very different. Because thinning a forest does not produce a profitable operation. The biomass plants don't pay for the entire cost of forest thinning. So these things aren't motivated by the need for fuel, they're motivated by the need for forest improvement.

And I do want to emphasize what the previous questioner said today, too. There's some cases here where I think we're going to say, okay, let's not do the treatment. Instead we're going to leave the forest in highly stressed and very poor condition, and we know it's going to incinerate it at some point, although we don't know when, in the future. Is that better?

MS. TUTAK: Um-hum. So to sort of point out the work that we did was not to advocate for, you know, a black or white interpretation of these results. It was really to put the information out there in a way that we felt, or that it hadn't really been presented.

So we wanted to make sure that those values were accounted for. And certainly, you know, there's a lot more discussion in terms of fire fuel treatment practices that need to be addressed.

DR. JENKINS: Time for one more? Yeah, Bryan Jenkins with the University of California Davis. I want to thank you for this work; it's great work to see, and appreciate you doing it.

MS. TUTAK: Thank you.

DR. JENKINS: Actually, I want to add to your homework load, too, --

MS. TUTAK: Great, I'll get my pad.

DR. JENKINS: -- so we'll get to that in a minute.

And NRDC, of course, has had some interesting policy outreach with respect to forests, biomass and the like. So that's interesting.

But just in terms of adding to your homework we've also been working on some similar type analysis and trying to improve the resolution on the data that we've been doing with the GIS models. And you might have heard something about biorefinery optimization yesterday perhaps.

MS. TUTAK: I unfortunately couldn't make it yesterday.

DR. JENKINS: Okay, well, anyway you'll hear about it in the future. But we did a study for WGA in which we used USDA data, U.S. Forest Service data for the forest biomass inventory, which is actually quite considerably different for California compared to the FRAP data. It's about half of it, and actually it's quite close to the numbers that you're coming up with from your study when you exclude these other zones at a higher resolution.

MS. TUTAK: Um-hum.

DR. JENKINS: So, it would be interesting to compare the model results, I think.

MS. TUTAK: Definitely. What was your name, again?

DR. JENKINS: Jenkins.

(Laughter.)

DR. JENKINS: It's in the program someplace.

MS. TUTAK: Yeah.

(Laughter.)

MS. TUTAK: Just wanted to make sure I had it.

DR. JENKINS: Anyway, thanks for that. I just wanted to --

MS. TUTAK: Thank you.

DR. JENKINS: -- acknowledge it.

DR. KAFFKA: Well, let's thank Jocelyn.

(Applause.)

DR. KAFFKA: I propose we resume at 3:00. We have two more presentations this afternoon, and then we're going to wrap up the meeting. And I think the last two presentations you'll find highly interesting.

So, give ourselves about a 15-minute break.

(Brief recess.)

DR. KAFFKA: So I'd like to get started. We have two more speakers left in our sustainability section.

Then we're going to ask the speakers that have presented today who are left to come up to the front and we'll have a more general discussion.

Then I can give you a note and you can all go home.

(Laughter.)

DR. KAFFKA: I want to remind you, those of you who have been using your notepages that we created for you, that if you're willing to share them with us we'd love to have them, with any suggestions and ideas that you have.

You're also -- I would like to urge you also to make suggestions during our discussion at the end of the day.

Our first speaker is Mr. Doug Berven, who, as it says here, is the Director of Corporate Affairs for POET, a limited liability corporation. I didn't really know this, but POET is the largest ethanol manufacturer in the world.

They apparently have out-competed the Brazilians, among others, and the other American companies. Largely a corn-based ethanol, but as you'll hear, they are also developing other processes to complement their corn-based ethanol.

Mr. Berven is, as I said, Director of Corporate Affairs. He interacts with -- is on the board of directors of several independently organized ethanol plants. He manages corporate relations for the company, and has a range of diverse responsibilities. He does a lot of representation of POET in public forums and inter-governmental relations.

So, Mr. Berven, thank you for coming.

MR. BERVEN: Thanks, Steve. And it is a pleasure being here, having an opportunity to talk to you today about maybe some things that you don't know about ethanol. Hopefully I'll bring some new information to the table that is useful in our ongoing discussions, the low carbon fuel standard and other regulations.

Just a little bit about POET, first of all. We have been in the ethanol business for well over 20 years. We currently produce about 1.5 billion gallons of ethanol on an annual basis. We are the largest producer in the world, given that number.

We have over 1500 team members throughout our organization. We have 11,000 farmer investors who have invested in our different plants. We take grain delivery from 30,000 farmers throughout the midwest. We have 26 ethanol plants in total throughout seven states in the midwest corn-belt area.

Our business model is very vertically integrated in that we do all of our own site location, our own plant design, construction. We market all of our products. We manage all of the plants. We do our own R&D, our own risk management, all under one roof that we call POET.

And as you'll see throughout this, I think you will find that we are a leader in technology in the field of ethanol production, not only in grain-based ethanol production, but also our cellulosic efforts.

Any new technology that we deploy we need to consider the triple bottomline of sustainability. And we call it people, planet, profit in our area. And just a couple of examples.

We have a responsibility to the 30,000 farmers that are delivering grain to us to be responsible and continue providing an outlet for their grain.

The ethanol industry employed just under 500,000 people throughout the country, direct and indirectly, in 2008. And we displaced 320 million barrels of oil in 2008.

From a plant standpoint we've done

lifecycle analysis on our plants, and our plants are offering over 50 percent greenhouse gas reduction to gasoline.

Water use for ethanol has decreased 26 percent since 2001. Total energy use for ethanol production is down 21.8 percent in the same timeframe. From a profitability standpoint, ethanol contributed over $65 billion to the United States gross domestic product in 2008. We added almost 20 billion in consumer income. Almost 12 billion in federal tax revenue. And replaced $32 billion in crude oil imports in 2008.

So it's hard to talk about development in grain-based ethanol without talking about agriculture, as they are married. Here is some information from a study done by the Keystone Group, sources field to market. And it shows what corn production has done over the last 20 years from a sustainability standpoint.

And you look at land use. Land use per bushel of corn produced over that 20-year timeframe is down 37 percent. Soil lost over the last 20 years per bushel of corn is down almost 70 percent. Irrigation, or the water needed to produce a bushel of corn is down 27 percent. The energy used to produce a bushel of corn is down 37 percent. And emissions created by one bushel of corn over 20 years is down 30 percent.

So these are numbers from the last 20 years, but the fact of the matter is the vast majority of these improvements have been made over the last ten years, given the escalation in corn technology, farming practices, and the like. And recently we have just mapped the corn genome, and all these advances are expected to escalate even further in the coming 20 years.

So, that was the last 20 years. Let's look at the potential for food and fuel over the next 20 years. The top line there shows the number of acres that were farmed for corn in 2007, 87.5 million acres were corn farmland acres.

And in 2007 we had an average United States bushel-per-acre of 151, okay. Last year it was 154. Continues to go up. If you plug in what du Pont and Monsanto are predicting for bushels per acre of land nationally, in the next ten years du Pont says, we'll have 211 bushels per acre. And Monsanto says by 2030, we'll see 300 bushels per acre. On the same amount of land.

So total corn production in 2007 was 13

billion bushels. In 2018, given those numbers, yield increases on the same amount of land we would have 18.3 billion bushels. And by 2030 we'll have 26 billion bushels of corn on the same amount of land, given technology increases that are coming.

So that gives us total production for food and feed of 10.9 billion bushels in 2007; 12 billion bushels in 2018; 15 billion bushels in 2030, which leaves the excess corn available for ethanol production as a potential of 24.7 billion gallons by 2018, and 48 billion gallons by 2030.

Now, what this is saying is not that we are going to produce 48 billion gallons of ethanol from corn in 2030, it says there's no shortage of grain in this country, or around the world. Last year we had a carry-out of 1.7 billion bushels of corn. That's the excess that's exported from this country. While we produced the most ethanol ever produced in the history of mankind.

So what these numbers represent is the same amount of land. We're giving 40 percent more corn for feed use. And it leaves 428 percent more corn grain for a secondary market, for example ethanol.

So the yield increases are going up, and if we don't have a secondary market for our grain in this country, we're going to subsidize farmers not to farm their land. We just don't need as much land anymore to get the same production as we used to.

So, we support the low carbon fuel standard in California. But I don't think there's any secret the ethanol industry has an issue with the indirect land use aspect of that. We are not asking for more land, and land can stay consistent throughout. All we're asking is to use the excess corn that is out there.

A recent study by Stanford said that there's over a billion acres of idle farmland around the world. To put that in perspective, we farm about 324 million acres in this country in total. And from 1987 to 2007 production increased 41 percent in bushels per acre. Those are hard numbers.

By 2030 corn production will likely double on the same amount of land. And deforestation is actually down, while ethanol production is up. There is not a direct correlation to the two. There's a de-correlation to the two.

Okay, so we've looked at agriculture. I want to talk to you about some of the production technologies that we have recently employed in our plants at POET.

The first one is a process called BPX. That's a raw starch hydrolysis process. In the ethanol industry everyone cooks the corn before it is fermented into ethanol. We've learned how not to cook the corn, so we save that amount of natural gas. It saves us 10 to 12 or 15 percent of the natural gas that we use in these plants.

It reduces our energy costs. It adds additional starch to the ethanol process. We get a higher yield from this process. It reduces fermentation byproduct formation. We get a significant reduction of VOC emissions; increased nutrient qualities and BVGs, and flow-ability and anti- properties are also advantages to this system.

The second technology I want to talk about is one called bfrac. That's a dry-milled fractionation process where we separate the corn fiber or the skin of the corn kernel; and then we take and separate the germ, which is the oily part, and the endosperm. And the endosperm goes into fermentation. This is another proprietary technology that we have, which adds a lot of advantages to our plants.

We have fractionation at three of our plants currently, looking to add more fractionation plants to more of our grain-based plants going forward.

But it adds a lot of value to the coproducts that we have. We preserve the nutrient characteristics and we can offer different species different profiles of feed when we do this.

Research and develop value for all new coproducts; air emissions from coproduct driers are reduced by approximately 75 percent. Reduction in nonfermentables in the fermenters down by 50 percent. And reduction in the plant energy requirements of 20 to 25 percent with this technology.

The next technology we recently employed at our plant at Chancellor, South Dakota. First on the bottom left-hand side of the screen, that is assimilation of our methane project with the city of Sioux Falls landfill.

So we have run a pipe 15 miles from the

landfill in Sioux Falls to our ethanol plant in Chancellor, reducing our natural gas needs by about 30 percent.

The second technology that we've employed there is a solid fuel boiler. We have a deal with a local pallet company who was taking all their waste material from used pallets to the landfill. They are now delivering them to us. We put them in the solid fuel boiler, and again reduce our natural gas consumption now by about 60 percent with that technology.

So those two technologies combined are reducing our need for natural gas in the area of 90 percent.

When the EPA came out and turned on the methane gas spigot with us, they gave us a nice little chart that showed what that methane project is doing in emissions. We are avoiding 26,000 tons a year of CO2 emissions by employing that technology there. Or the equivalent of taking 4300 cars off the road. Or the carbon sequestered by 5400 acres of pines. The CO2 emissions of 55,000 barrels of oil consumed. Or the equivalent of 2.7 million gallons of gasoline consumed. So these are real technologies that are being employed, improving in our industry as we speak today.

Other advances. We just set up a zero water discharge at our plant in Bingham Lake, Minnesota. What that's allowed us to do is reduce our water consumption at that plant from 3.2 gallons of water to produce a gallon of ethanol, to 2.6 gallons of water to produce a gallon of ethanol. That's a 20 to 25 percent water reduction with that recirculation technology right there.

We're also working with Magellan on a pipeline from the northwest corner of Iowa to the New York harbor. That's about a $3.5 billion investment, but as the ethanol industry grows we are going to have to reduce our transportation costs. And so we're excited about that partnership with Magellan.

There are a number of other technologies that we're working on just on the improvement of grain-based technology today. Make it cleaner, greener, better, more efficient, higher yields, you name it. But those are a few that are currently employed, we're using them. And we're not employing these because we've had to, we have done it because it makes sense from a sustainability standpoint economically, environmentally, for the people, for every reason.

So, all those technologies, in their own way, are enabling technologies for the biorefinery of the future, which includes cellulosic ethanol.

At POET we believe that cellulosic ethanol will be abundant and large scale within three to five years. That means it's competing with grain-based ethanol. We wouldn't have said that a year and a half ago. But since we opened our demonstration scale facility in Scotland, South Dakota, we are seeing tremendous gains on a week-to-week basis. Enzyme costs are coming down; the yields are going up from our biomass; and things are looking extremely positive in this area.

This is a picture of our plant in Emmetsburg, Iowa. This is the site of what we call project liberty. We will expand this facility to 100 million gallon grain-based facility and add a 25 million gallon cellulosic bolt-on facility to it.

So we're going to be using the current infrastructure that's already in place at this plant, reducing our capital expenditures, reducing our operating costs, utilizing the current infrastructure in place. And we will be using corn cobs as the feedstock for that plant.

The overview. It's going to be a $200 million project. It is in collaboration with the Department of Energy. We are one of six companies that were given the cellulosic award a couple years ago.

In total the biorefinery will produce 125 million gallons. Like I said, 25 million of that will be from the cellulosic feedstock. And there are multiple synergies with the corn and cellulosic model. When you look at a map at where the biomass is in this country, the vast majority of it is concentrated throughout the midwest in the corn-belt. That's where our plants are. That's why we want to use a bolt-on technology to use the existing infrastructure. And that's why we want to use corn cobs to start with.

Corn cobs are a true waste material for the farmer. They have the least amount of value in the field from a nutrient standpoint. And they're the best thing that we can use, outside of grain, for ethanol production.

So, the corn cob is the low-hanging fruit in the next generation of ethanol technologies. From there we'll add some stover, some switchgrass, other types of biomasses. But we need to start with the lowest hanging fruit, the easiest thing to do. And that, for us, is the humble corn cob.

We can make about 5 billion gallons of ethanol from corn cobs in this country. And I would guess that in ten years or so you will see the vast majority of farmers not only harvesting grain, but harvesting corn cobs, as well, for the energy that they can provide us.

And, yeah, I need to say this is a very large project. We are working with virtually all of the OEMs to retrofit equipment. We're working with the Department of Energy; several dozens, actually, of universities on different aspects of the production process. Biotech companies like Novazymes on enzyme production. And farmers.

I mean we overlook the farmer a lot of times when we talk about cellulosic ethanol. The farmer has to be willing to deliver a biomass to a plant. And so we are working very closely with farmers on how we best approach large-scale biomass collection, transport and storage.

So how will America benefit from cellulosic ethanol? The Department of Energy says that every 1 billion gallons of ethanol we produce, we produce between 10- and 20,000 jobs. Given that we can produce 5 billion gallons from corn cobs, alone, that would mean 50- to 100,000 jobs in this country.

Five billion gallons from corn cobs, alone, would also displace another 325,000 barrels of oil per day. I think that's what we're looking for.

Another DOE study shows that we can go way beyond corn cobs into biomass in general. They say that there's a billion tons of biomass available. We know, from producing cellulosic ethanol, that we can get at least 85 gallons of ethanol from a ton of biomass. That would give us 85 billion gallons of ethanol potential from the biomass in this country, which equals about 60 percent of the U.S. transportation fuel supply in this country today.

So biomass could effectively displace all of the imports to this country. Now, I don't know if we can do that because, at some point, we're going to make so much ethanol that gasoline prices come down. There will be an equilibrium in price.

I'm just telling you the potential of corn, as well as biomass, is tremendous. There is no shortage of either one of those products. And we can go a long way toward our independence, national security, helping the environment, improving the job and economic situation in this country with ethanol.

So what are the benefits? Gasoline enriched with ethanol burns cleaner due to the oxygen content in the fuel. It shows up to 30 percent fewer tailpipe emissions when burned. Reduces ozone-forming pollutants. It reduces greenhouse gas emissions of over 50 percent. That is from our lifecycle analysis on our plants.

No adverse effect on groundwater. Without ethanol gas prices would go up by 14.6 percent according to LEGC. Ethanol reduces U.S. dependence on foreign oil. And ethanol adds to the economic vitality of the United States.

So we see this as a bit of an American evolution. And we need to follow the natural progression of innovation. We can't just reach out and grab a shiny little ball somewhere. We need to continue to improve the grain-based production. We need to take the low-hanging fruit that's available to us in corn cobs. And then we can move into energy crops. And just progress along the way.

But we can't get sick of corn ethanol and try and get rid of it, and think we're going to get to cellulosic ethanol. That's not going to happen.

In fact, right now we have some competing legislation that says it's illegal to blend more than 10 percent ethanol in a car, okay. That regulation is directly in competition with the RFS that says we need to blend 35 billion gallons of ethanol in our cars by 2022. Can't do RFS without moving the blend wall. It's very simple math.

We are over supplied today because of the blend wall. And we have filed a waiver with the EPA to allow us to have 15 percent blend in our cars which will give us probably seven or eight years of demand so that we can attract the investment to grow into cellulosic ethanol.

Without it we're stalled, and we're not

going to do that. We're not going to invest $200 million in a cellulosic ethanol plant if ethanol is over supplied. We've got to change some regulations to make this work so that we can achieve our goals.

This is just our biorefinery concept of the future, which brings in corn; we fractionate it; we don't cook it; we use the BPX process to make ethanol. We bring in corn cobs, corn stover. We make ethanol out of that. What's left of the residual we'll take into the biomass boiler and the anaerobic digester and that plant will be completely self-serving as far as energy needs go.

So, this is where we're at. I've run through several of these steps that are already in place. And we are looking to move forward again with more of these technologies.

So, closing. I think it's important to understand that agriculture and ethanol are very serious about sustainability. We aren't doing these improvements because we've been made to. We've done it because we are good stewards of the environment, the land and everything else.

We need to balance the triple bottomline. Everything has to make sense to employ new technologies for the energy future of tomorrow.

Ethanol is a threat to the status quo. We are playing in the energy game, and there's a lot of misconception out there about ethanol right now. Because, look, our competition does not want to lose market share to a bunch of farm guys in the midwest, if that's a fact. It's going to be a fight, and we're in for a long debate, I'm sure.

Another thing to consider is I've just showed you that ethanol is getting better. Agriculture is getting better, ethanol is getting better. They're already good, while petroleum is getting worse.

Petroleum has picked their low-hanging fruit, the easy oil is gone. That's why we're important tar sand oil and oil shale from Canada, because it's becoming more scarce. It's becoming harder to get to, and more environmentally dangerous.

So ethanol is cleaner, greener, renewable, viable and available today. I'll leave you with a little fact that is little known. Ethanol supplies more Btu equivalents to this country than any other country imports to this country, outside of Canada. So, there's more ethanol used in this country than Saudi Arabian gasoline, which is the second-largest importer.

So it is available today, and it is changing the energy complex as we know it, and the debate will go on.

And I will look forward to any questions. Thank you.

(Applause.)

MR. THEROUX: Mr. Berven, thank you. Excellent presentation. Michael Theroux. The second-to-the-last or third-from-the-last slide showed your integrated biorefinery complex. And the only piece that I found missing in that particular one, you're using direct combustion for your biomass boiler, I would assume. Are you now investigating conversion technologies for the thermal properties, gasification, pyrolysis, in that space? It seems to be the only card that you're not showing on the board at the moment.

MR. BERVEN: Yeah, we're looking at all types of different energy sources, and processes. This isn't meant to be complete. It's meant to be somewhat of a caricature of what we see coming.

And the other thing that I didn't

mention in here is the other value-added products that we can make out of corn and biomass, which are especially chemicals, and neutroceuticals.

And, you know, the ethanol industry is in such a young stage right now. We haven't even started to exploit the value of agricultural products yet. And we can. And we can replace not only a lot of the gasoline, but a lot of the petroleum-derived products that are made through petroleum products.

So, we're working on all of those.

MR. THEROUX: Thank you.

MR. BRENDEL: Hi. Alex Brendel with AlgaeFuel.org. I look forward to cellulosic ethanol in three to five years. I really want to wish you the best of luck.

MR. BERVEN: Thank you.

MR. BRENDEL: I'd like to see that. My question is what happens with corn cobs today?

MR. BERVEN: Good question. As a farmer combines his field, he picks up the top half of the plant basically, which the corn cob and grain is on. The machine will take the corn grain off the cob, and then all of the corn stalk, corn cob and everything that isn't grain goes out the back onto the ground.

So the corn cob is actually going through the combine. We just need to devise a system -- we have -- that captures the corn cob and either puts it in a bin in the back, mixes it with the grain within the combine, or condenses it, it does all kinds of things.

But there are several ways to capture that corn cob without going over the field again.

MR. NICHOLSON: Bill Nicholson. When you were discussing the blend wall I was surprised you didn't say something about flex fuel vehicles.

MR. BERVEN: Well, thank you. The blend wall is our issue in the simplest form. But what we're trying to do with the energy complex in this country is a multistage process.

We need to raise the blend wall because we need to get more flex fuel vehicles on the road. We need to get more flex fuel pumps on the road offering a variety of blends to the consumer so that the consumer always has value at the pump. Whether that be E-85 and E-30 and E-0 for a small engine. That flex fuel pump is important, as well as the flex fuel vehicle.

So, we hope to see a ruling, a

requirement for flex fuel vehicles in the very near future. And I think that's how we get to a real alternative energy source, rather than an ethanol blended into gasoline. Ethanol can create an alternative fuel source for the country.

MR. SHAFFER: Doug, excellent presentation. Steve Shaffer. I don't know if you were here this morning to hear Secretary Kawamura's remarks, but also talking about the promise of agriculture now and into the future. So I think your remarks are very consistent with his.

One little nuts-and-bolt technical question, and then sort of a policy softball question to you.

The nuts and bolts is you projected, you know, Monsanto, du Pont, whatever, up to double the corn yields. Will you get double the cob yields?

MR. BERVEN: That's a great question, and I don't know if I can answer that. I think we'll have more biomass, but I don't think it's going to be on the order of doubling it.

MR. SHAFFER: Right.

MR. BERVEN: No. I think you might get

20 percent more biomass if you double the grain supply.

MR. SHAFFER: Um-hum. Yeah.

MR. BERVEN: I'm guessing a little bit, but I don't think we're going to double the biomass.

MR. SHAFFER: Yeah. And the sort of policy question. Of course, the low carbon fuel standard --

MR. BERVEN: Right.

MR. SHAFFER: -- has been talked about a lot. What do you see, or have you envisioned this new work group that will be formed by CARB to revisit this and look at it? How would you like to see that move forward?

MR. BERVEN: We'd like to be at the table. And we'd like to bring a lot of facts to the table that I think we failed to offer in the prior go-around. You know, a lot of this information is -- I'm sure a lot of people are sitting out here looking at this kind of curiously because we all think that we're starving the world because we're putting food in our tanks. That's simply not the fact.

We're putting field corn in our ethanol

production systems, putting the feed back in the feed market, and taking the starch and making ethanol with it. The starch is abundant globally.

And, you know, if we don't have a secondary market for agriculture in this country, what is going to happen to farming? We need a secondary market. Ethanol is good. And so, to answer your question shortly, we need to be at that table. It needs to be a well-rounded group.

In the last two days I've had meetings with several people that I think will be at that table. And we've opened up the dialogue already. And it's a very open dialogue. And the intentions of CARB and EPA and everybody else are in the best interests of this country.

But from our perspective, we have overlooked some things that have a negative effect, a growing, starting industry that shouldn't be stopped from more growth.

DR. KAFFKA: Thanks, Doug. Very nice, thank you.

MR. BERVEN: Thank you.

DR. KAFFKA: Our last speaker is Matt Rudolph. Matt's the American coordinator for the Round Table on Sustainable Biofuels, which I guess requires you to go to Geneva once in awhile, huh, Matt?

Prior to his work with the Round Table, Matt served as Executive Director of Piedmont Biofuels, which is a biodiesel cooperative in central North Carolina, which is renown for its emphasis on appropriate scale sustainable production. And also its educational focus. And he's still on the board of directors of the Piedmont Biofuels Cooperative.

He's also a biodiesel technology instructor for Solar Energy International, and has several other duties and tasks that he's going on with, as well.

MR. RUDOLPH: Okay, so I'm the last one, this is the last how many yards is it? A few. Actually a funny story about Doug. The Round Table is, I'll tell you in just a second, is a sustainable initiative. And we have many different stakeholders involved in it; POET is a member.

And we've been having a series of teleconference calls. And recently Doug called in. But it wasn't his time, it was actually a different group's teleconference call. He said, "Hi, this is Doug." We said, "Oh, Doug, actually I don't think that you're up yet." He said, oh, and some of the other people asked, "Well, who is that" And they said, "Well, that's Doug with POET." And they said well, who's POET? And they said, "They're the largest ethanol producer in the entire world."

(Laughter.)

MR. RUDOLPH: Somebody said, "Oh, that's cool."

(Laughter.)

MR. RUDOLPH: And the funny thing was I went and told that story to my friend afterwards and he said, "Who's POET?" So I think it's always funny, they're the largest and nobody's ever heard of them.

Okay. So, I was asked to speak a little bit about sustainability certification systems, in general, which that's actually not on my résumé. I'm not a certification expert. But I've been doing it now for about six months, so I'll do my best, based on what I can.

I'm going to start by giving you an overview of what you might look for, things to consider when evaluating voluntary sustainability certifications. And I'll describe what that is in just a second.

So, I've got three things on here. I've got a governance system. That's, you know, how is this system developed. The standards content, so what actually is written down. I'll get into that in just a second. And then implementation that's actually putting it into practice.

So first, how was the standard developed? Well, when you develop any type of a voluntary certification standard it's really important to have a balanced representation. It's critical for credibility.

It's also important to look at groups that might be vulnerable to misrepresentation, or unequal representation. So, for instance, having NGOs and industry at the table, if it's a global standard; like in the case of our group having the global north, as well as the global south. And it can be really tricky how to figure out how to have that balanced representation.

And then have things move forward, so, you know, obviously you get everybody together and people have a tendency to talk and talk and talk. And there needs to be some kind of body established to facilitate that communication.

That's what I do. I work for the Secretary, and we're basically where everybody comes to complain.

You also need to make sure that you've got a mechanism for participatory involvement. One thing that our group's been doing is traveling all over the world, really, seeking stakeholder input in how to develop sustainability standards for biofuels.

We had one in San Francisco as part of the National Biodiesel Board Conference just a couple months ago. Some of you participated.

And you need to insure that the standards development follows some kind of established norms, the governing structure. There are norms developed. ISO has some. And the ICO code, which is basically the standards for standard setting.

When you look at the content of a sustainability standard, you often find them divided into three different levels. One are what are called the principles. The principles are essentially those core values that any sustainability standard is aspiring to uphold.

And then when you look a little bit more detailed, you'll notice that there's some criteria behind each principle. The criteria are the details of the value that you're trying to address. So specifically what do you mean. So I put up an example here, and it's actually our version 0, our draft version for high conservation value and biodiversity.

It says: Biofuel production shall avoid negative impacts on biodiversity, ecosystems, and areas of high conservation value." Well, it sounds great in principle. What does that mean? How do you actually -- what do we mean by that?

And so, just one of our criteria, it was a shorter one so I could fit it on there, is: Ecosystem functions and services shall be preserved." Specifically what are we addressing?

And then there's the even more fine measure of the indicators. And the indicators are, they're kind of how these details that we describe, and how the criteria are then translated into real world metrics that can be audited in some way. So, how do you -- do you take these criteria and say, how are you going to look at that.

There's lots of things to consider with that. Or you can look at a performance-based, you know. Actually maybe you're going to measure how much VOCs are coming off that stack. Or are you going to look for best practices, et cetera, et cetera, there's all different ways to look at this.

Chain of custody. Very much talked about, as well. There's generally three different types of chain of custody that you'll find in different type of certification systems. Or maybe there's more that I don't know about. These are the most common ones that I've seen.

One is called track and trace. Track and trace is a system whereby you actually segregate that product. So something gets certified, and as it travels throughout the value chain, maybe it's, say it's biofuels, you grow the palm. You put that into a certified sustainable palm bin. Then it goes to the next stage in the process, completely segregated from the unsustainable palm, et cetera, et cetera. All the way to the certified palm biodiesel dispensing station.

There's a mass balance. Mass balance is

when you have a product certified, and then it gets all mixed together into one big green bin or barge or whatever. Shipped across the world, out it comes. You know that 37 percent went in certified, so 37 percent comes out. You don't know if you got that same 37 percent or not.

And then there's book and claim, which is one step further removed, where it's essentially you generate a certificate that says there's so many gallons or tons or whatever of a certified product somewhere in the market. It may not be this one right here, but it's somewhere in the market and someone can purchase those certificates and say, I have an equal amount.

And just putting these out there, they all obviously -- there's generally a tradeoff here. I mean there's going to be a tradeoff between cost and sort of integrity of the product.

And there's also another tradeoff with sort of risk of fraud. So as you get further and further removed from it, it gets a little bit harder to insure that that certified product actually made it to the market. It's harder to track, and it's just a little bit more difficult.

So, we're generally -- I think that the

way most biofuels standards are going to go is on a mass balance. But, you know, it's still to be seen.

And then implementation, the final piece that I wanted to talk about, is how are these standards content put into practice. So, for instance, once you've got all the details worked out, well, okay, how do you do the auditing.

The one important thing is to make sure that you've got qualified auditors. Who's doing the training? How are you insuring that they get proper training? Do you insure that the auditors, for instance, talk to local stakeholders as part of the audit? How are they reporting that data? All of these bits and pieces need to be examined when you look at a certification system.

When certification is granted, is there some kind of method of peer review? Is there an appeals process if somebody is denied? Is there some kind of process to address complaints and grievances? All of these things should be incorporated.

And oftentimes you'll see that we can't do it all. One particular certification body can't do everything, so that we'll accredit other agencies to, for instance, do assessments, do trainings on the principles and criteria, do the actual auditing, itself.

And so there needs to be a mechanism there to accredit other bodies to do that work, and to insure consistency and insure that these are independent, truly independent bodies.

That's sort of the basic framework of a sustainability standard. And I wanted to just go through a couple different ones just to give you a sense of what's out there right now.

One is the better sugarcane initiative. Just got some details on there, don't need to go through them. I'll just point out that you'll notice the five principles, legality, human labor rights, production input efficiency, biodiversity and ecosystem services. And the last one commitment to continuous improvement.

As I go through you can sort of get a sense of what are the different things that different certification programs are attempting to address.

So, BSI is obviously one. They're focused on the sugar industry and sugarcane. One is the Round Table on Responsible Soy. It's been around for a little while now, established in 2004. They're based out of Buenos Aires. They also have five principles: legality, human labor rights, community relations, environmental responsibility and good agricultural practices.

Again, these are just the very high level sort of what are they aspiring to address in their standard.

An update on them. This is obviously a soy standard. They've been stalled a lot, especially on the GMO issue. It's been very controversial and had lots of trouble. They've had to rename, et cetera. And they've been working to get this standard out for quite some time.

They've got their general assembly meeting. This particular group makes all final big decisions have to be made by general assembly vote, which is also, I think, slows them down a bit. And they're hoping to approve their principles and criteria in May in Brazil.

And then one more to talk about is the Round Table on Sustainable Palm Oil, which is the only currently fully functioning voluntary standard right now.

The first certificates for sustainable palm oil were issued in August of 2008. They've got national interpretations in four countries. What that means is you take the standard that's been developed, and then you have to regionally apply it.

So you need to go and look at what are the specific, for instance, high conservation values in your particular area, much like was done with the earlier speaker about California looking at how do you actually apply that to your particular area, using mapping, et cetera. What are the issues.

You look at their membership. They've got, it's multi-stakeholder. They've got the oil palm producers, the processors, customers good, consumer goods, manufacturers, retailers, et cetera. And then environmental nature conservation NGOS and social and development NGOs. And, of course, their principles.

And then actually I realized I left an important one off there. There's also the Council on Sustainable Biomass Production, which is working to establish a sustainability standards for cellulosic material here in the United States.

They're just getting started, as well. Sort of -- you haven't really quite heard too much about them yet. They're about to embark on their consultation period. So just as we just came out of ours, they're about to go into it. And so my sense is that you'll probably hear a lot more about them in the next six months.

And then I wanted to talk about some regulatory standards. Of course, everybody here, I'm sure, knows probably much better than I do about the RFS-2. But I just wanted to talk about a couple of little things in there.

Of course, it's a market approach, so the idea is to create markets for these different RINs, renewable identification numbers, based on feedstocks and GHG reductions, including the ILUC factor.

One interesting thing actually, I think that the RFS-2 is not necessarily bad for corn. If it's an existing corn facility, Doug, you guys are actually in pretty good shape as long as it was built before December 19, 2007.

And, in fact, if you really look at the numbers closely, they're proposing two different suggestions. One you see here, I've got the 30-

year time horizon; and the other is a 100-year time horizon with a 2 percent discount. So I'm sure many people know exactly what that means, and a couple people just glazed over. So I'll just explain it.

What they're saying is if we incorporate indirect impacts the idea is there's a carbon belch right at the moment that that land is converted. And then you're slowly working your way back. So you're slowly chipping away. Biofuels obviously better than -- hopefully are better than fossil fuels without that indirect impact. And it takes a little while to call that back.

So what is that payback period? So, for instance, if that payback period were 25 years, then on a 30-year time horizon you would see some benefit from biofuel, the use of that biofuel. You have to look at that full 30-year time horizon.

But if you were to put the time horizon at just 20 years it would look like that biofuel was actually worse than fossil fuels.

So a big question is how do you define that time horizon. And they're proposing a 30-

year and then a 100-year with a 2 percent discount. What does that 2 percent discount mean?

Well, as I understand it, and I'm not an economist, nor am I necessarily a sustainability certification expert, but the way I understand it is as you get further away, as you get further out, those benefits get a little bit less certain.

So, for instance, let's say that you were to plan for reductions for the next 100 years, but, oh, my gosh, we're on electric cars in 50 years. Well, you just threw away your last 50 years of hopefully that you were going to get those reductions. So suddenly your calculation is completely off and you were much worse than you, you didn't get nearly as much reductions as you had hoped.

Because we don't know what's going to happen in the future, you front-load it. You say that the ones in the beginning are more important than the reductions in the back because we don't necessarily know how much reductions we'll get.

Turns out, I think it's actually makes some sense, although it's a little bit obscure, if you look at this you'll see that for most fuels, not looking at the cellulosic, looking at what we have here and now, the 100-year 2 percent is much more favorable to biofuels.

And if you look at, for instance, corn, under best practices, like a new plant, you know, putting in all of what they consider best practices, even using natural gas, it's a 35 percent reduction. It's not bad, towards corn.

And if you use biomass like Doug mentioned that they have in one of their plants, it's actually a 39 percent reduction. So, it's actually not that bad. It treats corn quite well, interestingly enough.

And then there's also, I just wanted to point out that they do address agricultural land and land use change, their concept of renewable biomass. That's -- what they're saying is that the biomass for this, that qualifies for this RFS, actually needs to come from existing agricultural land, and they have defined what that's in there.

And then I want to just also post -- by saying that this is all just a draft standard right now, so this just came out. This is not set in stone. We're actually in a consultation period; we're listening to the EPA and providing comment. And so it's an interesting time. But this is scheduled to go into effect January 1 next year.

I also wanted to look at what the Europeans are doing. Here's one thing I can add to this conference even at the very end. I don't think anybody's talked about Europe yet.

The EU renewable energy directive has set a 10 percent target for renewable energy transport. And they plan to get there through biofuels.

They haven't addressed indirect impacts quite yet. But they have put together a commission to investigate it.

And they put their minimum requirement to qualify for essentially public support for biofuels -- and this is a binding target that they need to hit that 10 percent -- they've put it at 35 percent, a 35 percent threshold. Which then ratchets up to 50 percent in 2017 for existing projects. And after that time period, if you're going to build a new biofuels plant, to get that incentive it needs to even show a 60 percent GHG reduction. So it's just ratcheting right up.

They also talk about high carbon stock land. So, for instance, they mention these particular areas that can't be touched because of the carbon stock that they contain. And those areas that have high biodiversity values.

They didn't really get into social sustainability criteria too much. They do require monitoring of it, and they're going to reevaluate that in the future. So they just want to know. I think they're going to really be using that to figure out what they would be looking at.

So, just to say, I guess my -- before I talk a little bit more about what we're doing now, there's a lot of standards out there, both voluntary, regulatory. The LCFS is the first that really almost mandates certain fuels.

So it's a very interesting time to just sort of look at this landscape and you see all these different standards being developed, trying to get a sense of that. And, you know, I encourage you guys to go out and look at the different standards that are out there. There's many more than the ones that I mentioned. Just sort of giving you a sampling of what different groups are looking at. There's the Kraner Initiative and many many others, anyway.

So, who are we? What do we do? It's an

international group. It's based out of the Swiss Federal Institute of Technology, which is kind of like a mini-MIT in Switzerland. Just about an hour north of Geneva, so I don't actually get to hang out there.

And we do address environmental criteria. We address social criteria. It's intended to be generic, so unlike many of the other standards that are being developed, we're not looking at palm, or just soy, or any of these. We're trying to come up with what are the generic criteria that define sustainable biofuel production.

And we recognize that it's got to be adaptable, because, as we've been hearing for two days, this is a really moving target. And it's difficult to stretch your brain around all the different types of technologies that are out there and to think about.

And it really is truly multistakeholder. It's a very open process. All kinds of groups are getting involved. We encourage more groups to get involved. And the more groups that do get involved, I think, the stronger the standard gets. So it's great to have people across the entire spectrum at the table bringing their perspectives.

You'll see, there's a little picture there of these, the draft standard that was put out that's version 0. And that's the document that we just came out of a six-month consultation on.

Just talking a little bit about our governance structure. So, there is the Secretariat based at EPFL, the Swiss -- Institute of Technology. There are a series of working groups. There's actually two levels of working groups. There's the general working groups that are just individuals that want to participate. And then there's expert working groups that we cherry-pick from across the globe that are experts in their respective field of some issue that we are attempting to address.

And then there's a steering board. The steering board is a multistakeholder group. It's listed right there. This is the group that actually founded this initiative, WWF, UNEP, some governments, Shell, BP, et cetera.

And the secretariat basically has played the role of coordinator. So, all these different stakeholders from across the globe participate at the same time. The steering board said here's what we want in terms of a standard; checking in with the stakeholders, trying to move the standard forward.

We're actually in the process of changing this governance structure now. So, we're moving from a steering board to what we're calling a standards board.

And the nice thing about this is we're actually opening it up, opening up the membership. So, you're a stakeholder; you want to get involved; you couldn't be on the original founding steering board, now you can.

You join one of the 11 chambers that's listed right there. These are intended to represent people or groups, rather, that whose livelihood in some way is taken out of the biofuels industry, or is associated with the biofuels industry. And then we have a catch-all, number 11, that you can also fall into if you're not in 1 through 10.

I actually have this wrong. It's actually comprised of two representatives from each of the 11 chambers. So there's two reps from each chamber. One is intended to represent the global north, one the global south. And they make up the standards board. And that is the highest governing authority of the RSB.

This actually, the new chairs have been elected as of yesterday. So we're moving forward even as we speak. And the first meeting of the incoming standards board and the outgoing steering board is May 26th and 27th in Lausanne, Switzerland. So we're moving rapidly ahead.

I'll just talk real briefly, almost -- I already got a little bit of a quick nod, got to hurry up -- about the six-month consultation that we came out of.

We held 15, actually I think it was 16, somebody pointed out that I missed one, so 16 public consultations across the world to get a sense of where they were. It was a lot of fun and a lot of work traveling all over the place, hearing comments.

We got a list of comments, probably a couple hundred pages long. So that was a lot of fun sifting through that, organizing and incorporating. Sifting out the junk from the real comments and all that kind of stuff. And we did our best to incorporate those into the new standard.

Right now we're in a series of teleconference calls trying our best to incorporate those comments that we heard, plus the new comments from the new chamber members that have just been developed.

Just looking at the standard as we have it right now, or as it was in version 0 rather, we've got one on national law; we've got one on community consultation and impact assessment; some social criteria, one about workers rights, another about rural communities.

There's a principle on food security. One on greenhouse gas. We obviously address some environmental concerns. There's one on technology where we describe biotechnology and appropriate risk assessments, et cetera. And then one on land rights. Obviously can be a big issue.

And then the one thing I want to point out obviously is the direct/indirect. Some of these principles can be -- you, as a producer, have a direct impact. So, you know, you want to expand your soy production, as a farmer, that has a direct impact. That can be measured. It's very clear. And, of course, these illusive indirect impacts that aren't always so clear.

We've essentially said that there's three main ones that are of primary importance to look at. The food security, the greenhouse gas and the impacts on biodiversity is the three most important. There may be other principles that are also impacted by indirect impacts, but those are the three that we've tried our best to look at.

I'll just go through quickly some of the comments that we heard. This principle, it was intended to, I think we sort of lost our way on this one a little bit, because originally it was intended to be the notion of free prior and informed consent in going out to the community and making sure that they had buy-in.

When in reality what we're really trying to do here is set up -- it incorporates FPIC, but we're also trying to create a principle that underlies all the rest of the principles about general environmental impact and how do we -- how does a particular project assess their impact.

So we're working to reformulate this one a little bit. It's a little bit vague. But into this concept of an environmental and social impact assessment that stands through all the principles.

And as projects are developed, having them -- figuring out what are the requirements that they would need to do an impact assessment for both environmental and social that incorporates a portion of community consultation.

We have a principle on conservation. Some of the questions that we heard were how do we define these high conservation values. Many people said we need to define them as part of the RSP process. And others said, no, there's already a group out there doing that, the HCV network. And that we need to be better defining what we mean by high conservation values. If we're going to talk about those, at least reference the HCV network or develop our own.

There's been a need to develop a cut-off date. So, after a certain point there can be no more encroachment on areas that we decide to call no-go areas. So if a specific area is determined to have a high conservation value, beyond a certain date no more production. So we've tried to implement that.

We had nothing in there about invasive species, so we tried to address that issue. And there's been just a general, a lot of conversation about how do we deal with native ecosystems and especially in the global south where people are saying that they want development, and they haven't had an agricultural revolution yet. But at the same time the need to conserve those areas that are of high conservation value. And there's obviously a trade-off there, and how do you balance the need for both.

We've gotten a lot of comments on our greenhouse gas emissions, obviously a very important one. Because it's kind of become the focal point of sustainability from a regulatory viewpoint. Everything sort of has come down to carbon.

And a number of groups, it's funny, you talk to people in the EU and they say you set it at 35. And then you talk to people in the United States and they say you set it at 20. Basically it's just set it by whatever the minimum is in your particular area, and we'll be fine. That's sustainable.

So we've had a lot of trouble. We actually used the word significantly reducing. Nobody quite knew what that meant. And we've been working hard to define, does significantly actually mean a number, or is that just a concept.

And then the ILUC, the indirect land use change, obviously has been a big issue. How do we incorporate that. It's fine when you're the EPA and you can just say it's this, and you're CARB and you can say it's this. But when you're us, and you span the whole globe, it's like, oh, jeez, we don't -- even more difficult because we've got to incorporate comments from everybody. And it's tough. So we're trying to figure out how we're going to address this. We haven't quite decided.

And then food security, I'll just skip up ahead. Just talk a little bit more about indirect impacts. One thing that we identified in version 0 was that there's two different ways that indirect impacts present themselves.

One as land use change. And those primarily influence the principles on conservation and greenhouse gas. And then the other is in changes in commodity price. And that is most linked to food security.

So, for instance, on the second one, the one that's a little bit less obvious, is there you're not necessarily thinking about a land use issue so much as say corn becomes more valuable.

The whole grain basket price globally goes up just a little bit. And that can indirectly have an impact on people that can't access that food as easily as we can. They're already running the edge of being able to put in all their money towards purchasing from, et cetera.

So, because these agricultural commodities are global commodities, there's a real -- we need to look very closely at how to deal with the reality that while high grain prices are good for farmers, they may not be good for buyers. Especially in areas where people depend on those grains to survive.

Just some comments that we heard back about indirect impacts. Most stakeholders that we talked to believe that both of these are true. That there is an impact on land use, and that there is a concern about commodity pricing. That it can indirectly impact commodity pricing.

But they pointed to two things that we needed to think about. One is the responsibility. So if this is a voluntary standard is it fair for us to put those impacts, the responsibility for those impacts on an individual producer that can't actually do anything about it. There's no way they can correct their behavior. This is just something that's a reality. Is that fair?

And then, of course, the other problem was the degree of certainty. Many people brought up, well, we don't know what that number is. How can you just put a value there if you don't know it.

In some cases people had said, you know, it's positive or it's negative. Or, you know, we don't even know the direction of the value. So it's been quite an interesting conversation.

Just talking about a little bit towards moving forward. We're in the midst of our three rounds -- actually we just finished our three rounds of chamber calls. And I immediately jumped on a plane. So it's been a rapid pace.

We've just elected our chair and vice chair, so check off number 2. We've got our upcoming standards and steering board meeting, joint meeting, in Lausanne. And we hope to approve version 1 or version 0.5, but some kind of version of the principles and criteria at the meeting or shortly thereafter.

And as we move forward we're going to be talking about benchmarking of the standards.

That's what we're going to be looking at other standards and how they stack up against ours. I'll talk about that in just a second, if I have the time.

Chain of custody. Making a selection about chain of custody. And then we'll actually be pilot testing this. So this whole sustainability standard will actually get applied to specific projects to see what's realistic, what can we actually measure. You know, this might be idealistic, but there's no way to actually measure X or Y or Z.

Just really quickly, this is my last two slides, Steve. Just on the meta-standard concept. Here, I'll just skip right ahead. The concept here is because of -- remember, I mentioned all those standards at the beginning, looking at, there's a better sugarcane and there's palm oil, et cetera, et cetera.

Many of these standards they don't go all the way through the value chain like we're going to. They only address the feedstock portion. And within that they may not address the same portion of the feedstock that we look at in our standard.

But we also don't want to create double the work for a palm plantation that just went through this whole process of getting certified by the RSPO.

So what we're looking at is copying something that the United Kingdom's RTFO. The RTFO is sustainability standards that were developed in the U.K. And benchmarking standards that are already out there.

So, if somebody has the RSPO standard for palm, great. Now you want the RSB. You need it because your market demands it. That's fantastic.

Let's look at, we already know what the RSPO covers because we've benchmarked it against ours, but we know that it, say, leaves a hole in carbon. It doesn't address carbon adequately for us. So we'll develop some kind of a tool, something like a carbon calculator someone can put in, replace the default values with their particular production values. And see whether or not they qualify for the RSB value. And then, of course, there's some kind of auditing that's kind of simplistic.

But the point is to use the work that's

already been gone on, and then build upon it so that we're not competing with the other standards that are out there, but rather working in collaboration with them to develop a more broad standard.

Future timeline. Pretty much already went over that. And I'll just finish up. Great. Thanks.

(Applause.)

DR. KAFFKA: Do we have any comments -- fast.

MR. RUDOLPH: Great.

DR. KAFFKA: I guess we're running (inaudible). For the diehard (inaudible) we've asked our speakers today if they'd be willing to come up at the end of the day and (inaudible). So those who are still here who are willing to do that, I've asked our board member and colleague, Steve Shaffer, if he would moderate this portion.

So you have a chance now to ask questions about all those --

MR. SHAFFER: And while our afternoon panel is assembling, I think people can walk and applaud at the same time. So, I want to take this opportunity to recognize Steve Kaffka as Executive

Director of --

(Applause.)

MR. SHAFFER: -- the Biomass Collaborative. So, Steve, just an outstanding job in shepherding all of us through this, I won't say ordeal, but it's been an interesting journey, but well worth it.

So, I think we have all our afternoon panel assembled. I'll sort of take direction and follow Fernando's leadership from yesterday that I have a few concepts written down, but first I want to see if there are any other burning questions, thoughts, issues from the audience to any of the panel members to get the discussion going.

So, yes, please, our visitor from Korea.

MR. YI: Yeah, my name's Daniel. Before asking some question I'd like to have some, Mr. Levenson. Yeah. We having some MSW technology, the pilot and gasification. And that's the MSW technology. And Korea is already we say like a biomass, because we using the all kinds of even green waste, and also some used tires, burning it all together.

And the reason why -- is a couple of hours ago the (inaudible) was that our technology is actually invited having some speaking to the panel at the conference in Virginia, the North America waste-to-energy conference next week.

And in terms of my question, in terms of investment, you know, point of view, you say east coast has some tipping fees over $100. And that the west coast is $40, something.

But this is not a landfill. This technology, new technology coming is not a really size of the land. The reason why my guess, the European countries, they studied all -- it's not only the, you know, the size of the land, but also the tipping fees over $150, $200.

So that's the really, investors some internal rate of returns and concerns. And cannot develop new technology. But east coast can be available, but the west coast is not available because this tipping fee, because that's the major income stream to operate this technology at this moment.

So that's one of the questions, is there any -- the state of California can increase the tipping fee for the adopting the new technology to protect the environment.

DR. LEVENSON: So, the question is

whether the state of California can increase the tipping fee at landfills sufficiently to overcome that differential needed for investments.

It's a very politically charged question. There are a number of bills in the legislature right now to raise the tipping fee very marginally.

The tipping fee in landfills is $1.40 a ton. Even to raise it to $2 or $3 a ton has been politically very charged. And that would not be sufficient to change the economics.

I think you're talking about $10, $20, $30 a ton differential that would start to make a difference. That, in these economic times, is not something that's likely to be contemplated by this legislature, I'm afraid.

MR. YI: All right. And the second question is actually this MSW in Korea and (inaudible) some United Kingdom, they using this used tires burning, is not really direct burning, gasification.

And this country also, this state of California, can allow this. They used to, tires can -- by this technology. Because we concern about some kind of technically like the value of the municipal solid waste to efficiency of some calories by burning system.

DR. LEVENSON: Right. Yeah, I didn't talk about tires at all. But, certainly nationally the use of tires to -- direct fuel whether it's in a cement plant or something like that, it is a big use for waste tires.

In California it's about, if I recall correctly, perhaps 10 percent of the tires that we use are -- that we generate are used in cement kilns and at similar facilities.

Interestingly, there is a statutory prohibition on the Waste Board expending any monies on research related to tire-derived fuel. So, again, we come to the politics of some of the high-temperature technologies in California.

MR. YI: So if our company is willing to doing send a pilot project here, and then showing that the performance and really protect the environment issues by treating the used tires --

DR. LEVENSON: Certainly. There's nothing that would prohibit you, as a company, from doing that, assuming you met the appropriate permitting standards. It's just that the Waste Board, itself, is constrained from assisting in that endeavor.

MR. YI: So maybe your panel can help us to get some permit?

(Laughter.)

DR. LEVENSON: We can have a side conversation. But certainly if you're coming into the state and interested in a pilot, we can talk to you about the permitting kinds of issues that you need to deal with, and be happy to meet with you.

MR. YI: Thank you.

MR. HAMM: Hello. My name's Greg Hamm; I'm with Agui, LLC. I have what is, I guess, somewhat of a technical question. But I believe it has fairly strong policy implications.

If we take a ton of waste, let's say wheat straw, and we put it into a qualified biomass plant, generate electricity with it. If we take a ton of waste, put it into a cellulosic ethanol process, and create the ethanol, burn it in a car.

What is the comparison release of what I believe has been referred to as criterion pollutants, NOx, SOx, carbon monoxide, particulates, through those two pathways of using a ton of waste? Does anybody have an idea of that comparison?

MR. BERVEN: I don't have numbers, but I'm going to answer your technical question in a nontechnical way.

If we bring a biomass into our facility we're going to make ethanol out of it. We're going to make energy out of it. Whatever energy is the most valuable on a market basis, okay. If we can make ethanol out of it and generate power out of the residual of that biomass, so we can do both actually, with a lot of these biomasses.

But I don't have studies at hand where I can technically answer your question.

MR. SHAFFER: Let me just add a little bit. The lifecycle analysis through the GREET model at Argon National Lab and that CARB has used to assess the direct impacts of these different fuel pathways does include factors for the criteria pollutants. So that is somewhat taken into account.

I don't know if there's anyone from CARB here that wants to further elucidate. But also, Bryan, you might, as well, if you're so inclined.

DR. JENKINS: I don't remember the

numbers correctly, so I --

MR. SHAFFER: But, --

DR. JENKINS: There is a (inaudible).

MR. SHAFFER: You know, when I talk to some of the engineers over at the Energy Commission you look at the effectiveness of the criterion pollutant control devices on existing cars. And they're basically so good now that within somewhat defined parameters, it doesn't matter much what you're putting into the vehicle, whether it's non-oxygenated, oxygenated, things like that. The newest vehicles and their emission control devices, catalytic converters and carbon canisters to capture evaporative emissions, et cetera, they all perform on different fuels.

DR. JENKINS: I think the one caveat to that might be -- well, there's several actually, but --

MR. SHAFFER: Yeah, there are.

DR. JENKINS: -- NOx and VOCs, especially with aldehyde emissions with ethanol. Because I think that's been of some concern. I don't know if you want to comment on that from your perspective.

MR. BERVEN: Again, I don't have all the

data on that issue in my hands. I know that there's been talk about that and we're working on some of that data right now. It's in the works.

MR. SHAFFER: Just one other comment on that. I had suggested years ago to CARB, probably more than five years ago, to start looking at higher blends in the existing fleet, 15 percent, 20 percent.

I know there's work out of the upper midwest, South Dakota, Minnesota on that. But, to certify that those higher blends will not damage the emission control systems, and to make sure that CARB is part of that process is extremely important if you're going to address the blend wall.

MR. THEROUX: Good afternoon. Excellent presentations. Matt, this one particular for you, kind of a question for all of us.

Is the Round Table working on terms, what we call things? It's amazing to listen to the subtle nuance of what is biomass or what is waste or what is fuel or what is feed.

And we're all trying to find a level field for that. Is that one of the hit points for the Round Table?

MR. RUDOLPH: Funny you should ask. It's obviously critical. And, yes, so we've kind of had our hands full. Right now, as I mentioned, we just finished up three rounds on teleconference calls. We're hoping to approve this standard in May.

But there's no way that we're going to have a glossary of terms ready in time for all those things that you mentioned. And obviously that's critical.

So that's why you might have heard me sort of mention that we might do a .5 or something like that. And that's specifically to address the absence of those terms.

So the plan right now is to have all of our terms defined by November of this year at the latest. So we're actively working on that. Maybe we'll get to version 1 beforehand, but that's kind of what we're trying to balance. So obviously it's on our radar screen.

MR. THEROUX: One thing I might suggest is it's almost as instructive to see who has a slightly different definition, as it is to try to find a standard. So that we can see what is behind the use of the term, and the termination, what should be called what.

And perhaps just an initial step would be to say these groups call it this, these groups call the same thing this, da-da-ta-da, and be able to break out, if you will, the reasoning perhaps behind those things.

MR. RUDOLPH: Yeah, that's a great comment. Yeah. Thank you.

MR. SHAFFER: Greg, did you want to add to that?

DR. MORRIS: Yeah, Michael. You're actually, I think, touching on a really important issue as we go forward with all kinds of different biomass applications at different scales.

We have definitions in statute in California for biomass; and we have different definitions for different applications in different parts of the law.

And that's also true at the federal level. And right now at the federal level there are definitions being looked at, you know, for fuels, for renewable electricity. We have the renewable fuel standard here, which the definition actually is still not part of it. That got deferred.

We have a definition in statute for electric. And the fact is that these definitions are crucial in terms of defining what can and what can't be used.

We could easily see a situation where some of the more restrictive definitions that are being pushed by some parties could shut down half the biomass industry in California, for example, if they were to go into effect.

So these things are really crucially important, and we need to work on definitions that really work for everybody.

My own preference is to see the definitions as inclusive as possible with the fewest possible restrictions.

There's sort of two different approaches on can take. One can take the approach of let's put in the definition exactly what can be used, and then everything else is excluded. Or you can take a more inclusive that biomass is biomass. And then if there are certain types of biomass that actually have to be excluded, then those can be called out. And those are sort of two different approaches.

I much prefer the latter where you're

starting inclusive and then if you have actual needs to exclude some types of biomass, go ahead and do it that way.

When we start the other way we're inevitably leaving things out. And those things will then suffer, and the whole spectrum of what's available for the biomass industry is restricted. And that hurts the industry.

MR. THEROUX: This is incredibly damaging to our efforts to educate, as well. Because the public and the agencies and the legislature all see the confusion. And that we call the same thing, in their eyes, something different depending on what we want to get out of it.

And I don't have an answer, but recognizing that we're doing that would be going a long way, and being transparent about that.

MR. RUDOLPH: Yeah, I would also just like to add that there's also instances where it's even less clear-cut where you might use language such as optimize soil conditions. And then you really get into the technical nuts and bolts of what is soil health, how do you -- what's, you know, what do you look at in terms of carbon content, you know, in the soil, organic matter content, rather, et cetera, et cetera, et cetera.

So it can actually get quite even more difficult than that particular example, in our case.

DR. MORRIS: If I might even go back here, we have a situation where we know that some of the forestlands in California most in need of improvement, are federal forestlands. And we also have some efforts to say that any biomass from federal lands is not renewable.

So, if we actually come out with a definition like that, what we're doing is we're saying that the one type of biomass most beneficial to use is now not even allowed to be used.

So, we have to be really careful about what we're trying to accomplish with these definitions, because they do matter.

MR. SHAFFER: Please.

MR. NICHOLSON: A question for Doug. Your bolt-on technology for cellulosics almost looks like it would apply in other cellulosic industries. Have you looked into that? I'm thinking pulp and paper, things like that.

MR. BERVEN: I can't say that we have studied the other industries. We've been so focused on the corn cob to get that right, that that has been -- that's consumed all our time.

But we've been approached by the paper, pulp industries, and those types of things.

When you look at cellulosic ethanol you've always got to look at the biomass as being local. And so I think the bolt-on model is going to be the most viable next step in moving us forward with that technology. So, that's as good as I can answer.

MR. FRAVAL: I'd like to add something. This is a good place to add this. Come back to my immature industry again. Don't forget we have a very immature industry, and technologies like wind and ethanol are already somewhat up the curve. Much less immature, although they're still in the stage of immaturity.

What that means in the case of a question like this is that there are actually other technologies that can be used for pulp and waste paper. Specifically, my company has a biodigester system that'll completely gobble that stuff up.

And there are probably other technologies out there that can also address this particular kind of waste.

So, you know, we've got to be very careful not to focus in any one area or any other. There's a very wide spectrum here; the need is extremely large. It needs everything to address the problem, whether it's ethanol or wind or solar or biomass, which is our purview.

I think it's important to just say that.

DR. KAFFKA: Steve Kaffka. I have a question for the whole panel. It seems to me that one of the significant public policy creations or outcomes of the late 20th century is, in fact, a regulatory body of not only regulatory law, but also regulatory institutions. They didn't exist before the second world war, effectively.

And now, you know, every state has a set of resource institution, resource agencies that has state regulations, local regulations. We have national, federal regulations at the EPA. And you can almost see this almost a lust for regulation continuing with the Round Table on Sustainable Biofuels, which is now going to be worldwide regulation.

But also we hear at this meeting, from all sorts of participants and speakers, that it's the very regulatory system that's been created out of all good intentions, which is stifling or thwarting innovation.

So in addressing the idea of net benefit we're trying to take this larger picture. I'm interested in the panel's views about how we can resolve effectively, and in a reasonable timeframe, this kind of contradictory condition.

DR. LEVENSON: I'll make a somewhat snide comment back. I view that as unified environmental field theory, and --

(Laughter.)

DR. LEVENSON: -- we've been working on physics, the unified theory in physics, for 100 years. And so I've been through a number of different exercises that try to set up frameworks to do tradeoff, the costs and benefits, and how do you -- what's the calculus for making those kinds of decisions.

And it's been very frustrating. The USEPA has tried to do it on the national level. And Cal EPA has tried to do it here. And I'm sure there have been many international efforts.

So, it's critical, but I'm not sure that anybody has come up with a pathway that makes sense that can get enough stakeholders to buy in. How you overcome, at the U.S. level, the different statutory drivers say of the federal Clean Air Act versus the Clean Water Act.

And at the national level, and I'm sure you can speak to that much more, the sovereignty of nations and it just seems almost intractable, yet it's one of the key underlying issues, along with the definitional issues.

And with that comment I'm afraid I have another obligation, so I have to leave. But wanted to throw that out. Thank you.

MR. SHAFFER: Moderator's prerogative. And you can listen to this as you leave, Howard.

I made comments on the low carbon fuel standard and these are -- I'll reiterate these. And I've told several people, so.

But there's a new -- my new favorite word comes from Temple Grandin, which is an animal scientist, behavioral scientist, and she works on humane treatment of animals.

And her word is abstractification. And she talks about the academic world and the government world of regulatory development. And how very often theories are presented, and regulations are developed on those theories. But they're not ground-truthed. They aren't verified.

And she, as an animal scientist, is also autistic. So she's called in oftentimes to look at the humane treatment of animals as they're going to slaughter. And because she's autistic she sees these minor details, as if the animals would, that normal humans wouldn't.

And so she gets down on her hands and knees in the stockyard, in the chute leading to the slaughterhouse. And she can pick up on small details. And then simple solutions.

Well, if you're not willing to do that and get on the ground, get your boots dirty, then it's an exercise in abstractification.

And this is what I said to the Air Board as they debated and adopted indirect land use change. That this was an exercise in abstractification. And we haven't taken the time to get in the pen with the animal and understand the animal.

So I think that's one small step that we can all ask of the academic community -- and I was a 34-year civil servant, so, you know, I was part of the problem perhaps for some of that.

But to make sure that, sure, you're making policy decisions, but you have to at least then follow up with that on-the-ground verification. So there's the theory, and then there's the application of the science, as well.

I'll get off my soap box.

MR. BERVEN: I have just got to touch on this real quick, because I'm going to try and make this short and brief. And, Matt, I'm going to pick on you a little bit. I like you, but there was one thing that you said in your presentation that struck me that hits on this question.

And believe me, I like Matt, and I like what RSB is doing. We're a member of it and everything. So I'm not trying to be negative.

But, we have taken the indirect land use theory to a point where we have adopted it as real. Where we cannot prove it. And when indirect land use change takes ethanol from a 50 percent improvement to a 10 percent improvement to gasoline, we can't say that doesn't matter.

Because if you talk to a bank or investor or someone building one of these projects, ethanol is no longer considered a renewable fuel according to the specs in the renewable fuel standard.

So, what we have done with indirect land use change, without being able to prove it at all, is taken ethanol and not let it compete on its good graces with gasoline through legislation.

So, we need to be very careful with the laws that we pass. Good intentions can often cause bad consequences. And I think this is one of them. So, just had to say that.

MR. SHAFFER: Please.

MS. HEINSCH: Hi. My name's Barbara Heinsch. I'm with the Waste Board. And this is my first time at the Biomass Forum.

I have the same kind of question about how we all can work together to come up with more environmental laws that would work more standardized. And I realize that the gentleman from Korea that said something about how come the cost of landfilling on the east coast is so much higher than on the west coast.

And that got me thinking about the fact that on the west coast we have more land per person, so we have more space. Whereas on the east coast people have been there longer, and it's more -- there's more population so there's more competition for places to dump our waste.

But here in California, of course, we have very unique environmental considerations because we have minimal water, and the air is being polluted. Things like that.

So I know -- what I'm getting at is I know it wouldn't be easy to come up with a standardized anything. However, with a forum like this -- in California about this new and growing biotech or biomass and biofuels and emerging technologies, I was just wondering if this is, now being new to this whole environment, is this now something that's going to be a worldwide forum, a U.S. forum?

Where are you guys going with this? Because it would seem like there could be some commonalities from California to other states. And maybe even not just looking at land use, things like that.

I'd be curious to know has there been any environmental catastrophes from any of these kinds of technologies. I know there was talk in Sacramento about an arc plasma facility. And that got, you know, put in the papers and everybody got all freaked out. And it got pulled.

So, I was just wondering, what is driving this concern? Has there been legitimate catastrophes that people are all up in arms about? And if there hasn't been, maybe just someone, maybe it would take a nationwide effort or, you know, who knows where the money would come from, to do some sort of comparison.

Okay, look, we've got X number of anaerobic digesters in New York, or whatever state where they have them. And there's been zero accidents. It works great. There's not been an environmental catastrophe.

And to educate the public, not just in California, but throughout the United States and the world about how these technologies work, what environmental laws or places. Oh, yes, this has a good scrubber, this has good groundwater. You know, kind of -- I'm a table kind of person, I want an Excel spreadsheet that finds it all and puts little boxes.

So, I know I've kind of rambled on, but the idea is where are you guys going from here.

(Laughter.)

MR. SHAFFER: I'm going to defer answering that for a purpose, and go to the next gentleman. But I'll come back to that, I promise.

MR. BRENDEL: Are we still stating names? Alex Brendel with AlgaeFuel.org. I'd like to point out right at the end of this conference a hugely overlooked resource.

Somebody I met here at this conference, their business card had a neat comment. It said, it's a waste to waste waste.

So, in that light I'd like to mention what I think is for hundreds of years a hugely waste resources, -- sewage. I don't think anybody said it better than from this quote here. See if anybody recognizes this comment.

Paris throws away 5 millions of a year into the sea, and this without metaphor. How and in what manner? Day and night. With what object? Without any object. With what thought? Without thinking of it. For what return? For nothing.

By means of what organ? By means of its intestine. What is its intestine? It's sewer. Five millions is the most appropriate of the approximate figures which the estimates of special science give.

Science, after long experiment, now knows that the most fertilizing and the most effective of manures is that of man. The Chinese, we must say, to our shame, knew it before us. No Chinese peasant, (inaudible) tells us, goes to the city without carrying back at the two ends of his bamboo two buckets full of what we call filth. Thanks to human fertilization the earth in China is still as young as in the days of Abraham.

Chinese wheat yields 120-fold. There is no guano comparable in fertility to the detritus of a capital. A great city is the most powerful of sterocoraries -- sorry, I don't know that word -- to employ the city to enrich the plain would be a sure success. If our goal is filth, on the other hand, our filth is gold."

Does anybody recognize that? Nobody. It was written in 1860 by Victor Hugo, when he was talking about Paris. It's from "Les Miserable". It's chapter 10, 2nd, the intestine of a leviathan.

Please.

DR. ZOIA: Well, I don't want to comment on French classics, but --

(Laughter.)

DR. ZOIA: So I give you an example. L.A. produces, I think, more than half a million tons of sewage, dry waste. So I've looked at using that in the gasification process. And basically it just comes to an economic analysis.

And it is, you know, it has a lot of water in it. And it is pretreated so the heavy metal content is not that high. But right now it is used for fertilization in Kern County. Naturally, Kern County is suing L.A., the L.A. agency that does that, because they don't want the sewage from L.A. to come to Kern County.

It is basically just an economic -- there are fuels that are more efficient and they cost less. So, you either put a tax or a penalty on those other fuels, or you find you try to develop a better technology to use the sewage.

AUDIENCE SPEAKER: (inaudible).

MR. FRAVAL: I just add one thing. There is also, there's a social dimension. I think you'd have a real hard time, you know, we've been talking about permitting, you'd have a real hard time permitting this.

And one of the reasons, whether it be real or not, doesn't matter, one of the reasons is the residue, drug residues and pharmaceutical residues that you would find in that sewage stream.

And for those two reasons I would look elsewhere when there's lots of elsewheres to look at.

MR. BRENDEL: Yeah, I agree that there are a lot of difficulties in dealing with pathogens in human manure. I'd also like to add that Professor William Oswald, he wrote his PhD thesis in 1954. And he wrote his thesis on growing algae on municipal waste.

He designed systems to treat sewage using algae. And that was the focus of his 60-year career at U.C. Berkeley. He's the reason I have a copy of this. It was he that brought it to my attention.

There are, today, a handful of his systems still in existence that are operating up in wine country, northern California. The city of St. Helens has a very excellent water treatment facility, and they use what I call the high-rate pond system that's designed by Dr. William Oswald. It costs less to operate. It costs less to build that plant when it was built than a conventional sewage treatment system.

It does take more land because basically growing algae you need a lot of insolation, you need surface area with the sun's light shining on it. But it's a really good system. And it's a technology that's pretty well established and very well documented.

I hate to see the work that he did be lost and forgotten simply because it's overlooked. And I'm just really happy to bring his work to everybody here's attention. Because I feel like you people are my friends, and you're people that are kindred spirits.

MR. SHAFFER: Doug.

MR. WICKIZER: Steve, Doug Wickizer. I guess taking a somewhat experienced regulator for many years, as you have about the same experience timeline you have. When you get into a command-and-control situation, just an observation, whether it's a new or a long-term, the outcome's different.

But you have to have the opportunity to deal with abstractification. And a good regulatory system allows you the opportunity to do basically a make-your-case regulation.

In other words, it allows you to demonstrate the balances, the net environmental benefits, per se, whether it's a certification type of regulation or a command-and-control type regulation. They both have the same result. And it indicates certification, you can't play in my market.

In the case of regulation different penalties. But they still have that same concept. So, any framework we develop has to have the ability to allow that innovation.

Systems that I've seen that work allow that. They have some concept of performance that goes with it. In a newer industry that cost is higher because the science isn't quite a sound. And you have a more difficult time making your case, to hopefully something considered an impartial decisionmaker. That's something else that needs to be assured.

What I haven't heard a lot of how to insert that make-your-case concept into the frameworks.

MR. RUDOLPH: Yeah, I think that's a good point. And I guess, well, first off, when you think about the net environmental benefit, I think that obviously there's a tradeoff here. And I think a good way to look at it is, you know, where are you going to -- you've got this dial that you can move, you know, back and forth, where are you going to put it.

Because you got to pick a point. At some point you just got to say, it's here. And then, you know, push the industry in the right direction.

I think the right way to do it is to slowly push the dial in the direction you want to go, so that you don't stifle innovation, but you promote the practices that you want.

And then the other thing is I really like the concept of make-your-case. I think that that's true, but I think the case needs to be made on science. And so I think that you have to keep coming back to the science, and you have to really work closely with academics and scientists, and have them, you know, make the scientific case.

And even that can be difficult obviously, you know. Scientists don't always agree, and understood, that's probably the biggest problem we need to figure out how to deal with that.

But, as much as possible, I think that the case needs to be made on science.

MR. SHAFFER: Bryan and Steve reminded me the room is going to close in about seven minutes. So that's our timeframe.

And I'm sorry, it looks like the young lady from the Waste Board ducked out already before I could follow up with her question. But I will do that, anyhow.

DR. JENKINS: That's all right, I'll try to leave you enough time hopefully.

Bryan Jenkins, UC Davis. Matt, maybe you talked about this, but I'm going to get really abstract at this point. As we develop global sustainability standards to address not only bioenergy, but probably other energy sources, as well, what's the thought regarding global monitoring? What is the procedure actually to monitor the effects of these practices that we're developing, industrial practices, as well as the regulatory processes that we're going to put in place. What's the consideration for the technology, monitor, and then how to verify.

MR. RUDOLPH: Do you mean monitoring the impacts of the regulation, or monitoring the impacts of the technology?

DR. JENKINS: Both. And just to give an example, we have technology, for example, to monitor perhaps global biomass by type and location.

Is that going to be considered in the monitoring effort that goes along with the development of the global sustainability standard?

MR. RUDOLPH: Well, I guess just to separate those out, because to look at the impacts, for instance, of voluntary certification, I think it is important to have some kind of method to look at, whether or not the standard that you've developed is having an impact, is actually influencing the market in some way. Or what kind of an impact it's having.

And I didn't put it up there as one of the things to look at within a certification system, but I think that it is important to have something, to self-monitor, what is this doing.

And then in terms of like the more global picture of what is the impact of this, of the whole industry, say bioenergy or biofuels industry on the world.

I don't know that you can -- I mean I

think that we are going to -- I mean that's a tough one. I don't know how to address that other than just to look to the scientific community for guidance on where we need to go.

So I look at things like the IPCC and look at 750 parts per million and these types of things, and give, you know, they set targets and then we sort of try to set up the standards that can help make sure that certain global measurements that we need to hit, for whatever those specific principles might be, that biofuels are in line with that, or bioenergy are in line with that.

So I think we work the other way, really.

DR. JENKINS: If I could just take another 30 seconds before Steve -- I can ask Doug, and maybe others from the industry, what do you want to see in the way of monitoring to make your case?

MR. BERVEN: Accuracy, really. I'd like to see accuracy; I'd like to see the latest technologies considered in the scientific numbers. We've done our own lifecycle analysis. Our analysis is very different than what the overall broadbrush is on the industry.

And we think there is a lot of outdated agricultural numbers that are being used in legislating laws. And, you know, I guess I could just say that we've been investing in cellulosic ethanol technologies, enabling technologies, trying to get there about eight years now.

We've invested in the solid fuel boiler, methane gas, and the pipeline and BPX and all these things. Not because we were told to or legislated that we have to, this is the progression of the ethanol industry, to make more sense environmentally, economically, socially. All those aspects came without the legislation.

Now we have a very significant piece of legislation that hurts us in indirect land use change. And, I mean, you cannot borrow a dollar for an ethanol plant today. You just can't. Because too much uncertainty.

We are wondering now whether ethanol is a green industry or not. And I think that's a poor place to be. And I think it's unfortunate. And so I ask for accuracy. That's a long-winded answer, but accuracy would be great.

MR. SHAFFER: And so, Gregg, last

comment from the panel. I have a closing question and Steve has some closing remarks.

DR. MORRIS: I would add to that the concept of portionality. I think it's really important, as we start talking about imposing more costs on renewable energy, whether it be because we're posing sustainability standards for -- I happen to be on the board of the WREGIS, which is a tracking system for renewable energy. And it came time to say how are we going to pay for WREGIS, and the obvious thing was well, we'll charge all the renewable generators a fee for each renewable certificate they create.

And I said, well, why don't we charge the fossil fuel generators and not the renewables, because otherwise we're handicapping the renewables compared to the fossil fuel generators.

Naturally we're charging the renewable generators, but we have to be really careful here. We're now going to impose new standards on biomass, but are we going to impose sustainability standards on oil production, for example? The answer is obviously not, because it's not sustainable, so why would you even think about doing that.

But by adding costs to biomass that we don't add to the obviously worse alternatives, we're actually going in the wrong direction. So proportionality is really important.

MR. SHAFFER: Good. Great. That's a great closing comment. To be faithful to the young lady who asked the question, where do we go from here.

That is my final question. I was going to have it as a panel discussion, but we've run out of time. So, my question is Steve handed out this at the beginning of the forum.

How can the Biomass Collaborative help in these efforts? So, we're going to take that discussion offline. But certainly provide the feedback to Steve, and the board members.

How can the Biomass Collaborative be most effective in terms of advancing policy, advancing science, what-have-you. So just think about that a little bit and give some feedback to any member of the board, Stephen and Bryan in particular. But, please think about that because this is part of the two-way conversation.

So, thank you. Steve.

DR. KAFFKA: Well, I've had, personally,

a very stimulating two days. And in my opening comments I talked about having to reach beyond our limits to try to integrate new knowledge and insights with what we already know, and come up with perhaps new pathways.

And I'm hopeful that all of these very excellent presentations that we've had help us individually do that, to go back actually and do something which Nietzsche said all cows have, and which modern humankind lack, which is the ability to ruminate.

In other words we need to do a little creative rumination here with all this terrific input, really terrific input.

And it's our commitment, as part of the California Biomass Collaborative, through our board and through our membership, to try to do this creative rumination and digestion. And to see what kinds of policies we can go forward with.

I would welcome any comments that you have. You can either add -- we can put the -- if you've written anything out on our handout, please put them in the back where Martha is standing, and suggesting that we put them back on the tables in the back on your way out.

We'd welcome emails and phone calls and comments, if you have other, with suggestions.

We will be posting all of these proceedings as quickly as we can on our website, and that will include transcripts of all the comments that have been made, as well as the actual verbatim presentations, themselves. It's a kind of a nice feature that's on the website. That takes a little longer. They will have probably the slides up sooner, and then the transcripts up later for your reflection.

I want to thank everyone again who's participated as a speaker. I want to again give special thanks to Martha Gildart, who's retiring. Martha, do you want to raise your hand so we can salute you, again.

(Applause.)

DR. KAFFKA: Thank you for years of dedicated service. And thank you all for participating.

(Whereupon, at 4:58 p.m., the final day of the California Biomass Collaborative Forum was adjourned.)

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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 23rd day of June, 2009.