CALIFORNIA BIOMASS COLLABORATIVE

CALIFORNIA ENERGY COMMISSION
CALIFORNIA AIR RESOURCES BOARD
CENTER FOR ENERGY EFFICIENCY AND RENEWABLE TECHNOLOGIES
THE UNIVERSITY OF CALIFORNIA AT DAVIS
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Reported by:
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Mary Nichols, Chairperson
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Roundtable on Sustainable Bioenergy

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ALSO PRESENT

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Southern California Edison Company
Edison International

Bruce E. Dale
Michigan State University

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P R O C E E D I N G S

8:40 a.m.

DR. JENKINS: On behalf of the sponsors who have come together in making this possible, I'm pleased to be able to welcome you to this joint forum on bioenergy sustainability and lifecycle analysis.

I'm Bryan Jenkins; I'm Co-Director of the California Biomass Collaborative. And I greatly appreciate your attendance here today and over the coming days.

This state, like many other states in the nation, and around the world, has embarked on a major transformation of its energy system and its economy. The task that is before is, of course, by no means trivial. To adapt a system and make it robust in the face of massive economic, social and environmental challenges will require our best talents and, of course, perseverance of will.

These challenges provide immense opportunities for improvement, however. And we have the opportunity to redesign our energy sector, make it more efficient and more sustainable. I little doubt that any other path will do as well.

Of course, it's this issue of sustainability that brings us together today, and for the next two days, in this forum. Sustainability of biofuels and other forms of bioenergy, and energy, in general, is much debated these days. But there are few topics so much discussed, and I think, so little understood.

Yet still we engage, and we have made recommendations here in the Collaborative over the last few years, and we'll continue to do so, I suppose. We engage in efforts directed at developing standards of sustainability that can be practically implemented, routinely applied, and justifiably enforced.

Standards that can define, measure and achieve acceptable levels of performance and provide sound guidance and direction without proving so confining or prescriptive as to inhibit innovation, much needed innovation.

But designing such standards is a matter of public debate, and your charge here over the next couple of days is to listen carefully, voice your opinion in a spirit of sharing, and provide us all the benefit of your wisdom in helping to craft the framework for the future energy development of this state and throughout the world.

So, really what we're doing here in shaping sustainability standards for bioenergy will soon enough extend throughout the energy sector as a whole, and possibly beyond that. So what we do here is rather remarkable. In fact, I'm privileged to have served in some capacity over the last few years in working with many people in biomass and bioenergy. And it's a pleasure to meet with you here again today.

This forum is a result of joint planning efforts by the principal sponsors who are the California Biomass Collaborative, the California Energy Commission, the California Air Resources Board, the California Institute for Food and Agricultural Research, the Center for Energy Efficiency and Renewable Technologies and the University of California at Davis.

Of course, there are many other people involved in this effort, and I thank them all for their participation. Support for the forum has come from many organizations, institutions, corporations and individuals. You all are here supporting this effort, of course.

Before we get too far along I do want to acknowledge the dedicated individuals who have labored quite hard over the last months so that I might, in my leisure, stand up here before you. And you will see most of these people up here on this podium at some point, either in a moderating position or speaking on topics of interest. But wherever you see them please do thank them for their efforts on your behalf.

So just to name a few, and I'm sure I will forget any number of names here, so forgive me for those of you who I leave out of this list.

Martha Gildart of the California Biomass Collaborative. Martha has served diligently as Program Chair, patiently overcoming any roadblocks, including those I throw up there along the way, in her path to success. So, to Martha I offer and extend sincere thanks.

Rob Williams, also of the Collaborative, who really serves as a rock in all this process, reminding us -- reminding me, in fact, to pay attention and get things right. And to Rob I also offer sincere thanks.

Steve Kaffka, my Co-Director in the

Collaborative. He's sitting back there. And you'll hear from Steve a little bit later today. And you'll meet with him in a different capacity here by the time we get done with this affair.

Sharon Shoemaker, who is Director of the California Institute of Food and Agricultural Research. John Shears with the Center for Energy Efficiency and Renewable Technologies. Enrique Manzanilla of the U.S. Environmental Protection Agency, who is on loan to the California Energy Commission and was intimately involved in bringing a number of us together in this joint forum today and tomorrow and Friday.

Also Diane Schwyzer, McKinley Addy, Tim Olson, Val Tiangco and others of the California Energy Commission. Anil Prabhu, Bob Fletcher, John Courtis and others of the California Air Resources Board.

Certainly the members of the Executive Board of the California Biomass Collaborative for their effective and sage advice. And it is my discredit if I do not always heed it, so I apologize for that.

And, of course, the staff of the conferences and the event services division of the

University of California at Davis who have been sitting out there taking your registration this morning, and of course, providing other services in preparation for this forum.

And, again, to all those I have left out and forgotten, I apologize. But I do thank you for the efforts you've put in to making this forum happen.

There is one person who will not be with us today who was scheduled to speak, but unfortunately will not be with us. And who will be sorely missed in our continuing discussions on sustainability. A remarkable intellect, a force among us, a guiding light, a light all too soon extinguished. I refer, of course, to Professor Alex Farrell of the University of California at Berkeley. Alex, may peace and joy be yours now.

And, of course, it is not without some sorrow, but with great appreciation for the opportunity that I've had over the last five years, and with confidence for the leadership that will come after me, is that I announce my departure from the Directorship of the California Biomass Collaborative.

Effective July 1st I will step out of

the role of Co-Director and leave it entirely in the hands of Dr. Steven Kaffka from the University of California at Davis. Steve is an expert in sustainability, and one who I am sure will offer a clear voice in this wilderness before us. And, Steve, thanks very much for taking this on.

And to you all, I offer my sincere thanks for your years of support. Thank you very much.

All right, now to business. First of all, if you have questions, and we have left room in the program for question and answers, and I hope that moderators and the speakers will work diligently to try to stay on schedule. I am already two minutes beyond schedule, so we'll try to get back on here.

But if you would, when you have a question and you want to put it before us, if you would come to this microphone over here, I think this is the microphone next to Peter; ask your question; identify yourself; and please give Peter a business card or tell him who you are. We are making a transcript of these proceedings so that we can have a record for all to review later. And it's helpful to know who it is that's asking the question, and who it is that's providing the information.

We have a busy program over the next three days, so I do hope we try to stay on schedule with the speakers and whatnot. Because I do want to hear, or we all want to hear actually, what everybody has to say on this. This really is the opportunity to engage in a public discussion within the state about the issue of sustainability, particularly in bioenergy; but then, where we go from there, as well. It's a difficult topic and one that requires many voices to get it right.

All right, so today we address questions and principles surrounding the sustainable production of biomass and bioenergy. We follow today's program with sessions on lifecycle analysis tomorrow. Wrapping up on Friday with attention to state policy and other policies towards sustainability standards, the preparation of these standards. And the enactment, implementation of these standards we think is critical to move forward in this arena.

To lead us off here we have two key agency leaders. We have Commissioner Jim Boyd of the California Energy Commission and Chairwoman Mary Nichols of the California Air Resources Board.

No stranger to these forums our first speaker, Commissioner Jim Boyd, was appointed by Governor Schwarzenegger to a second five-year term on the California Energy Commission in February 2007. And has served as Vice Chair of the Commission since 2006.

Prior to his first appointment to the Commission in 2002 Jim was Deputy Secretary and Chief of Staff of the California Resources Agency. He also served as the Chief Executive Officer of the California Air Resources Board.

He currently presides over the Energy Commission's Transportation Committee; is the Commission's representative on the Steering Team of the California Fuel Cell Partnership, and has served on the Governor's Hydrogen Highway Network Implementation Advisory Panel.

He led the Commission's efforts to develop a state alternative fuels plan and oversees the implementation of Assembly Bill 118, which you'll hear more about over these next few days, which established the state's alternative and renewable fuel and vehicle technology program.

Jim also chairs the Bioenergy Interagency Working Group; I've had the pleasure of working with this working group. And that group has been working on development and now implementing the Governor's Bioenergy Action Plan. And Jim's been very instrumental in coordinating many of the state agency actions surrounding bioenergy development.

And so, Jim, if you would, please, enlighten us.

VICE CHAIRPERSON BOYD: Thank you, Bryan. Good morning, everybody. Bryan just reminded me how long I've been Chair of the Bioenergy Agency Working Group, or its predecessor organization. That's got to be pushing ten years. My, it has taken us a long time.

Anyway, it is indeed my pleasure to be here today to speak to you on these important topics, sustainable bioenergy and the importance of lifecycle analysis. I'm particularly pleased that I'm sharing the podium with ARB Chair Mary Nichols. Our partnership, that is the partnership between the Energy Commission and the ARB, really does drive home the point that energy and air quality have been and remain inextricably joined together in California.

And Mary and I, our paths have crossed. She's been my boss, my mentor and my friend for many many years. And having spent 20 years of my life in air quality, it's hard not to talk about it on occasion.

But it's also quite obvious in California that you cannot separate these two subjects. Air quality improvement and energy diversity have been mutually compatible state policy goals in California, as I indicated, for many many years. And the Energy Commission and the Air Resources Board have worked collaboratively to accomplish these goals.

Recognizing the link between energy diversity and air quality, our two agencies worked together to bring natural gas supplies to California to fuel our power plants as far back as the 1980s, before the rest of the continent discovered that natural gas was the cleanest burning of fossil fuels.

And all the way up to the almost present day, in 2003 we prepared a joint report on, quote, "reducing California's petroleum dependence" which recommended alternative fuels and fuel economy goals for California. And we've worked ever since then to drive that point home. It's become more and more obvious to people over the past few years, but it certainly has become -- the need has become obvious in the last several months.

And I used to think it would take $3 gasoline to drive the point home, but it's taken nearly $5 gasoline to drive that point home. But at least the point is well made, and people are now less inclined to point the finger at each other and other folks, and recognizing that we do have yet another energy crisis on our hands.

But today climate change has become the major policy driver for concerted action in California. As I like to reflect, air quality has been California's principal driver. Once in awhile my friends, and then myself at the Energy Commission, got to take the baton because there was a sudden realization that energy security through energy diversity might be important. But that always tends to fade away. But air quality has never faded away.

I think 9/11 made us more aware of energy security needs in this country. Price volatility began to add to that. And then to top it off, as I said, the climate change driver, which again first here in California, has really been the ultimate driver for concerted action.

Since emissions of greenhouse gases are produced from the production and use of energy, we now recognize the need to address the carbon footprint of all aspects of energy. And, of course, as most of you know, throughout the world it's the production and use of energy, but it's almost predominately the production and use of electricity through either using coal or fuel oil.

But it was California that first discovered, maybe because of its cleaner electricity fleet, that it's transportation, and the use of transportation fuels that is public enemy number one for us in this state.

Because of California's leadership on climate change, the pursuit of energy and renewable energy sources, especially bioenergy produced from California waste streams, has taken on new importance. And I would just say even added new importance in the face of the food-versus-fuel debate that we are now engaged in, as a nation, if not as a planet.

So, we have recognized the need to consider greenhouse gas reduction strategies as part of this total system that we now need to address.

Lifecycle analysis, fuel cycle analysis, well-to-wheels, field-to-wheels, cradle-to-grave, call it what you want, we now recognize the need for new analytical methods and approaches and new decision tools to weigh the costs and benefit of new fuel and new energy options.

We have found, or I think rather rediscovered, the issue we now call sustainability. And I think it's been called many things down through the years. And I hope we stop trying to fix names on it and stick with one and get to the task.

As most of you know, nearly two years ago now the Governor signed executive order SO606, urging state agencies to expand the use of biobased fuels in an effort to combat high gasoline prices. That was the principal driver of that price volatility of petroleum. However, fortunately, we were able to convince the Governor the subject is really bioenergy, biopower and biofuels.

So, I'm here today to tell you that the State of California remains committed to sustainable bioenergy development. And, indeed, progress is being made to achieve the state's bioenergy goals, which I would admit, were fairly ambitious goals when they were set.

On April 25, 2006, the Governor said, as he addressed this subject, quote, "Turning waste products into energy is good for the economy, local job creation and for our environment." His order challenged state agencies to a series of specific actions and milestones to promote sustainable biomass development in California.

Later the Energy Commission in its Integrated Energy Policy Report further underscored the significance of harnessing California's urban, forestry and agricultural residues as a source of biopower, biogas, biofuels, bioenergy.

I'm pleased to report that we have made progress, steady progress, if not somewhat painful progress, during the years, but particularly during the last year, in realizing our state's bioenergy goals. In large part due to the effort of, certainly, many of you in the room, but our state agency partners and Bryan Jenkins and his staff of the Biomass Collaborative, and the Collaborative members.

And I want to take this opportunity to thank Bryan for his steady sure hand on the subject of biomass and the Collaborative. The earliest years we got to know each other seemed like rather frustrating, futile and dark years. But we've been around long enough to see light at the end of the tunnel, and it's no longer the headlight of that oncoming locomotive. I do think we see real progress.

The state alternative fuels plan, which was mentioned, which was adopted in late 2007, included California's first effort to perform a full fuel cycle analysis of alternative transportation fuels. And I will say, as one who dove into the pool with other folks looking at this subject, as I like to say, we thought it was a fairly deep dive. But at the time we couldn't even see the bottom of this pool

This is an incredibly complicated subject matter. And multiple agencies and many of you remain committed to clearing the air on this subject, pardon the pun, and to provide us with a decisionmaking tool that's absolutely necessary to the kinds of decisions we have to make when we look at full cycle analyses of things. Because major capital investments will be made depending upon the answers that we provide. And we have to provide meaningful answers to make sure we don't take incorrect forks in the road, so to speak.

The analysis that we did in the alternative fuels plan provided an analytical framework for the low carbon fuel standard. But as I indicated, it was recognized and remains to be recognized that far more work needs to be done.

Finally, in recognition of the fact that the state lacked a significant funding program to support the demonstration and deployment of alternative fuels and vehicle technologies, unlike the areas of electricity and natural gas, for which there have been a public goods charge provided funds to help us incent, subsidize and do research and development in those areas, unlike those areas the transportation fuels and technology arena has been a very empty field for quite some time in terms of our ability to incent.

But as I indicated, the Legislature passed, and the Governor signed, Assembly Bill 118 by Assembly Leader Nunez. I might say it was a hard-fought battle, and seems to be a never-ending battle, but nonetheless, that legislation has gone into effect.

And the legislation authorizes state funding for seven and a half years to both the Energy Commission, $120 million a year, and the Air Resources Board, $80 million a year, for grants, loans, loan guarantees and the use of other financial instruments to, in particular, develop, demonstrate and deploy fuels and technologies, and infrastructure therefore. And both agencies are working cooperatively to implement their respective responsibilities under this law.

So, again, working with our partners at the ARB we are in the process of preparing an investment plan, with input from a high-level advisory committee, and working to provide the necessary framework and the regulations that the law requires to begin funding activities which we expect to begin sometime early in 2009, after we finish dealing with all the process that we've been obligated to by this legislation.

Since this was a new field to many

people, we are feeling our way along very carefully.

So therefore, kind of in concluding and helping Bryan gain back some of this time I just want to close by saying that it's been my view for quite some time that California is both cursed and blessed with significant biomass resources.

And it's high time we put some of these resources to work providing some of our energy needs. It's been recognized for a long time we should be doing that; maybe now it's becoming more of a universal theme in this state.

And in doing so we can, in turn, solve other environmental and societal problems which people are just beginning to realize, including making a contribution to lowering our carbon footprint. All we need to do is get the economics a little more straightened out. And I think what's happening today is straightening out the economics of dealing in this arena.

As you know better than I, California, as I said, has an incredible amount of biomass resources. Materials in the forest, I like to joke that Smokey the Bear was wrong. We shouldn't have left so much debris there. And once we challenge and accomplish the environmental challenges associated with that, we have access to some materials.

Urban waste, in all its various forms, we're beginning to recognize even more as a potential. And agricultural waste, be it food, fuel, food or food wastes from crops growing in the fields, or the manure that we have from all those dairy cows in California, all have been recognized as a resource.

So, I would just say in closing, we need to continue to work together. Those of us who have been at this for a long time need to see you pick up the challenge and run towards that goal. And let's start putting that what was once deemed waste, which is now recognized as a resource, to good work for the citizens of California. And address the multitude of problems that we have facing us, not the least of which, perhaps the biggest of which, is climate change and the fact that it drives us all to look at the system as we've never looked at it before.

Thank you very much, and I hope this is a very fruitful forum for all of you. It's been the pleasure of the Energy Commission to support the Biomass Collaborative for all these years, and we're grateful for the progress that has been made.

Thank you.

(Applause.)

DR. JENKINS: All right, our next speaker is not quite here. She's on her way, we're informed. So it's not often that we get the opportunity to catch a Commissioner and keep him for a few minutes.

I think as we go along through the next several days it's important to realize that we're really discussing all of the resources. So even though we may not have targeted presentations on everything that you may be interested in, we are dealing with the entire spectrum of resources for biomass in the state.

And so I will, at the good graces of Commissioner Boyd here, will open this up if you have a question for the Commissioner. Please approach the microphone and address your question, anybody with a question.

And please tell us who you are.

MR. MILLER: My name is Scott Miller. I write the bioenergy blog ring, and I'm also involved in the Rangefields project for converting biomass in Georgia to cellulosic ethanol.

And I think we're all agreed here that the status quo needs to be changed. And I have a great fear that if we bog down those that are trying to create these new technologies and deploy them with too many strictures, and too high a bar, that we're going to discourage investment and deployment.

So my question is, is there some way to progressively implement the kinds of standards that we all agree we need to have to make this energy development sustainable?

Thank you very much.

VICE CHAIRPERSON BOYD: That's a very good question; it's one we have pondered quite a bit of late, particularly with the advent of the low carbon fuel standard and what that means to California.

And I think the agencies, in working together, and all the members of the bioenergy interagency working group have recognized that we need to continue to make steady uphill progress. We might do it in plateaus, and that means there's going to have to be a fairly broad recognition of what you just indicated, that we're going to have to do this in stairsteps.

And because we do not want to bog ourselves down, we do need to develop the working tools that will give us the answers that we seek. And as I already indicated, that's no easy task. That's a very tall order. And we don't want to stop dead in our tracks until such time as we get there.

So, recognizing that dilemma I think we will work as best we can. If we get the understanding of all involved, and there's no disagreement over the fact that we have to do this in increments, that we're not going to suddenly race to the top of the mountain and have all the answers for everybody, then we can persist in making the progress.

I think, as we, at the Energy Commission in particular, work to implement the alternative fuels plan, and as our friends and partners at the Air Resources Board work to implement both AB-32 and its companion, the low carbon fuel standards, I have faith that California will do as it's done in the past, and continue to drive for progress and to drive technology.

So, if I've answered that long enough, we now have our next speaker.

(Laughter.)

VICE CHAIRPERSON BOYD: But there is someone waiting in line, perhaps.

MR. THEROUX: Perhaps. Commissioner Boyd, good morning. I'll make it quick. Michael Theroux; I'm an appointee, among other things, to the Los Angeles County Integrated Waste Management Task Force, Alternative Conversion Technology Committee.

There's a hurdle we recognize. You mentioned the biomass available in the urban sector. In California we lack the last piece of law that says how much you have to beat on that waste to no longer have it waste.

What do we have to do to get what New York sees as a cessation of waste piece of legislature that then allows us to treat this material truly as a resource rather than a waste?

VICE CHAIRPERSON BOYD: Well, he brings up a subject that probably most of us are painfully aware of, and some of us are very disappointed in the inability of California to move that subject further. Perhaps we need to march on the Capitol later to -- no, I didn't say that.

(Laughter.)

VICE CHAIRPERSON BOYD: The impediment has been getting that piece of -- that fairly, what some of us think, simple piece of legislation through the California Legislature and past certain communities who strongly resist the change for fear that it may alter their futures.

We thought we were going to do it last year. We were convinced we were going to be able to do it this year. And I hope we can do it in the not too distant future.

I don't know what to say other than it's been a disappointment. And I can't tell you how many legislators I've talked to, and how often I prod a sister agency, whose main charge it is to address that issue.

Hopefully the magnitude of the issue and crisis, and the food-versus-fuel concern has focused enough attention on this waste stream solution that perhaps we can convince enough people, and we can finally get the law slightly straightened out.

It's kind of embarrassing to point out

that other states have the wisdom that we don't seem to have. California should persist in being a leader, but this is one of those areas where we have stubbed our toe badly.

DR. JENKINS: I want to thank Commissioner Boyd for being here this morning and for answering those questions.

All right, our next speaker is Chairwoman Mary Nichols with the California Air Resources Board. And Chairwoman Nichols was appointed by Governor Schwarzenegger as Chair in July 2007. She returns to the Air Board 30 years after serving as the Chair under Governor Jerry Brown from 1978 to 1983.

She's devoted her entire career, she says, to public and private not-for-profit service to advocating for the environment and public health. In addition to her work at the Air Board she's held a number of other positions including Assistant Administrator for the U.S. Environmental Protection Agency's Air and Radiation Program under the Clinton Administration. Secretary for California's Resources Agency from 1999 until 2003. And Director of the University of California Los Angeles Institute of the

Environment.

As one of California's first environmental lawyers she initiated precedent-setting test cases under the Federal Clean Air Act, and California air quality laws, while practicing as a staff attorney for the Center for Law in the Public Interest.

She holds a JD degree from Yale Law School and a BA degree from Cornell University. And in return as Chair, her priorities include moving the state's landmark climate change program ahead, as well as steering the Board through numerous efforts to curb diesel pollution at ports; and continuing to pass regulations aimed at providing cleaner air for southern California and the San Joaquin Valley. Much needed results.

She values innovation and partnership common sense approaches to addressing the state's air issues. We do, as well.

So, if you would, please, Chair Nichols.

(Applause.)

CHAIRPERSON NICHOLS: Well, thank you very much for that introduction. Good morning, everybody. I can barely see because of the light in my face, but I know you're out there.

So, I'm here this morning to give you a little bit of an overview of the Air Resources Board's program for implementing Assembly Bill 32, and hopefully touch on some topics that are of mutual interest as we think about how we, as a state, can move forward with some solutions that not only improve our carbon footprint, to use the term of the day, but that also will produce a more prosperous and healthy California.

And I'm here today in large part because having spent a number of years working with Commissioner Jim Boyd in various different capacities, I am a believer that the issues that you all are here representing are a part of the solution.

And like him, having just heard the last couple of minutes of his responses to a question, I feel that the State of California has many opportunities to do better in managing and using the energy that's in waste materials in the State of California.

So, I'm going to just take a step back here and say that I came back to the Air Resources Board almost a year ago in order to take on the responsibility of chairing the premiere air pollution control agency in the world. And that's not just my opinion, that's the opinion of many other people, as well.

California has a history of pioneering in setting health-based standards and in promoting green technologies. And we believe that our efforts in this area have been a part of the state's prosperity, not an impediment to the state's growth and prosperity.

We know that people come to California in large part because they are attracted by the beauties of our natural environment. And everything that we can do to preserve those attractions is a part of preserving California's heritage in every sense of the term.

So, why are we worrying about global warming? It's a global problem, right? Well, yes, it is and we know that we can't solve it here by actions that we take within the State of California.

Nonetheless, the impacts of global warming are more severe for us, and have appeared earlier and are more noticeable to people here in California than in some other parts of the world, at least, and are part of the reason why the

Legislature and the Governor felt compelled to do something about this.

Just a couple of factoids. The measured winter and spring temperatures in California have been going up over a period of decades, and we have good records. The Sierra Mountain snowpack, which is our major source of drinking water for both central and southern California, is melting earlier every year. And sea levels, in fact, are rising. We have actually measured almost a foot of sea level rise at the Golden Gate Bridge in the last 100 years. A foot may not sound like much, but when you're talking about sea level and the amount of land that is inundated by that, it's actually a huge impact.

So, the decision has been made that the time for discussion of whether there's a problem or not is over. That without action we know we face a future of disruption, and it is not a positive direction that we want to go in.

And we also know that, although we can't completely stop it, because the build up of greenhouse gases in the environment is already beyond the point where we can completely reverse or avoid the effects of global warming, nevertheless we can blunt the worst effects. And we can do it in ways we believe that are also helpful to our state's and our country's energy independence, air quality and other issues, as well.

So, what can we do about the problem? Well, we know that the largest part of our state's emissions and the largest part of most people's individual contribution to emissions of greenhouse gases is the way in which we move ourselves around. It's our drive. Mostly the commute, but other forms of driving, as well.

So, in AB-32 the Legislature requires the state to emit no more gases by the year 2020 than we did in the year 1990. And having done our analysis of the baseline from 1990 and projecting forward as what would happen with business-as-usual, we're talking about roughly a 30 percent actual overall reduction in emissions above business-as-usual in California that we will have to achieve by 2020 if we are going to meet that legislative mandate.

The emissions breakdown is about 40 percent coming from the transportation sector. So, reducing the carbon intensity of transportation fuels is one of the critical paths that we're on to try to achieve that goal.

When you're looking in the transportation sector we have really three choices, and we have to pursue all of them. We have to make the cars more efficient; we have to have cars that produce less greenhouse gas emissions, which means more fuel efficient, and pretty quickly transitioning away from petroleum burning at all in our vehicles.

We need to make the fuels that are still being used by the cars that are on the roads today and will be on the roads for years to come less carbon intensive. And we also need simply to get more people out of driving vehicles all together and into transit systems. And that means the goods movement sector, as well. More traveling, less use of petroleum.

And so we're working very hard to try to develop sustainable alternatives to help reduce our state's carbon footprint.

The Air Resources Board is not doing this alone. We have support and involvement from every other agency in the state in one way or another. In particular in the area of fuels and transportation, we have strong partnership with the Energy Commission. And also increasingly with Caltrans in the area of designing of transportation systems and spending the state's transportation planning funds in ways that are more supportive of a lower carbon future.

We have one measure included in the set of what are called discrete early action measures, which are regulations that the Board is required to adopt faster than we are able to get our entire plan under way.

The AB-32 requirement is that essentially all the major measures in the plan are supposed to be operational by 2012. And where the Board is right now actually is that we are developing a plan for how to do that. The draft scoping plan will be out at the end of June. There will be extensive period of public consultation, and we expect changes to the plan, as well as some choices that have to be made, because the draft plan comes out in June, is going to lay out a couple of major options in addition to a group of core regulatory measures, options in terms of achieving additional reductions either through a regulatory path or through a cap-and-trade system, or through a use of carbon fees.

And we're going to lay out some of the pros and cons of each of those alternative paths. And we will be asking for comment from the public, as well as doing a lot further analysis, ourselves, before coming up with a final preferred option by the end of this year.

But one of the core measures that have to be adopted in the 2010 timeframe is the low carbon fuel standard, which grew out of an executive order from Governor Schwarzenegger, telling the state to design a program which would reduce the carbon intensity of fuels.

And this measure really grew out of a report that was developed at the University of California through several different researchers, as well as other stakeholders who have been urging us to find ways to get the fuel supply industry, mainly meaning oil companies, to invest the kinds of large sums of money that are going to be needed to bring on lower carbon transportation fuels in the future.

To do it by setting a mandatory goal, but not dictating exactly what the choice of fuel would be. But also writing specifications to deal with some of the tougher issues about how to make sure that in getting off of petroleum we're not buying ourselves other problems, or specifying a fuel which actually does not overall improve the level of carbon emissions.

So, the way that we are doing that is through a requirement for a complete lifecycle analysis. The ARB, in writing the regulations for the lower carbon fuels, intends to consider emissions relating to both direct and indirect land use implications of biofuels, production, refining, transportation, as well as the vehicle usage of these fuels, in order to assure the most accurate possible accounting and mitigation of any potential impacts in comparison with the fuels that are sold today.

We're also in a position where we have to recognize that we are not operating as an island here. We have to consider the interactions of our measures with any federal actions, including the recently passed Energy Independence and Security Act.

That means that we are in very close communication with the U.S. Environmental Protection Agency, as well as with other countries that are also formulating their own low carbon fuels regulations.

It's a very important measure for us because we're estimating benefits on the order of 15 million metric tons by the year 2020. So this is really a critical ingredient of our program to meet the goals of AB-32.

But we also know that without having perfect information today, which we don't, that we're very vulnerable to issues of environmental and social sustainability if we don't handle them correctly during the regulatory process. And we are making every effort to not make any major mistakes. But realistically we don't know entirely where all the future sources of fuels will come from.

The one thing that we can, I think, know pretty clearly is that anything that is produced from material that would otherwise be considered to be a waste is going to have a benefit over anything that is grown explicitly to be a fuel.

However we end up doing the life cycle analysis, it simply is -- it's guaranteed that if you have a material where it's already, you know, been through some other phase of its life, and would be considered otherwise as a waste, that it's going to be in a much more advantaged position.

The bigger problems I think that we face, at least with some of the cellulosic ethanol approaches that people are speculating about and doing research on is simply that we have to make a pretty big leap at this point from the research laboratory to the reality.

And unfortunately, while we discuss these issues we're seeing further and further investment on the part of the agricultural sector in creating and processing fuel from what would otherwise be food crops, such as soy and corn.

And even with imports from other countries, California does not feel that we can operate as an island. So, you know, the fact that maybe we don't have any palm oil being produced in California, but there would be forests that would be destroyed as a result of other countries deciding to cut down forests and grow crops for fuel. It doesn't excuse us from having to at least look at the net greenhouse gas effects of those kinds of activities.

So, once again California is determined

to be a leader in an issue which does have global implications. But at the same time we can only do that in a way that provides positive examples that other people will be willing to follow, because we have no other mandate.

So we have to depend on defining our goals appropriately, and using the best possible science. And one area in which we are blessed in California is access to some of the finest research minds and facilities anywhere in the world. And we are trying to take full advantage of that partnership that we have.

So, I think that the main message that I want to leave you with this morning is that this is an important piece of California's policy going forward. We're very concerned about it because we know that if we don't do this right we could end up not only not improving things, but also, you know, spending a lot of money and causing consumers to spend a lot of money on a solution which doesn't actually move the ball forward.

At the same time this is a fast-moving area of science and of knowledge. And so we can't and we shouldn't try to completely control what the private sector is doing, or the decisions that people make who want to put their own capital at risk.

At the same time if we don't send the right signals we know from experience that we can end up being tied to solutions which will turn out not to be those that we want for the long term.

So, I hope that's enough of an overview of where we find ourselves, and an invitation to you to participate in this process, if you're not already, it's an ongoing major rulemaking.

And I think with that I will stop and leave some time for questions, if I may. Thank you very much.

(Applause.)

DR. JENKINS: Thank you very much, Chair Nichols. You're willing to take a couple of questions?

CHAIRPERSON NICHOLS: Sure.

DR. JENKINS: So we have a couple minutes here. If you have a question, please approach the microphone over here and address it to Chair Nichols.

MR. MATTESON: Good morning.

CHAIRPERSON NICHOLS: Good morning.

MR. MATTESON: I have a number of issues

regarding your LCA approach. And I'm wondering to what extent that LCA approach is covering all the principles that are important for sustainable biomass production.

And we're going to probably hear it as the keynote speaker today, a person who has put some principles up on the board, Dr. Cramer.

These principles will flow to standards I assume, at some time. And at some time there will have to be a decision as to whether or not to use fuel X as opposed to a bad fuel or a good fuel.

Has the organization that you're working with considered what principles you're going to be using as the basis of your LCA?

CHAIRPERSON NICHOLS: That is part of what's going on right now in the rulemaking process. There are a number of suggestions out there for how to do this. We haven't come out with a rule as of yet.

We're expecting to have a proposal out on the street in about the August timeframe. And before we get to that point we will have looked at pretty much any set of analyses in the standards that anybody has developed. And hopefully we will have at least considered them, if we haven't accepted everything that anybody might think we should be using, we'll at least have explained why we made the choices that we did.

MR. FRIEDRICH: Good morning, Mary.

CHAIRPERSON NICHOLS: Good morning.

MR. FRIEDRICH: My name is Axel Friedrich from Umweltbundesamt, which is (inaudible) of Germany. I'm the Head of the Division of Transport and Noise.

You mentioned that waste is always a positive aspect. I'm not sure. So the question is if some belief you have collected food oil, it's normally not thrown away, it's used in other areas so we have to make balance between this use and the other use.

And this is very often the case, most of it is not thrown away, it's used for other purpose. So, I just would like -- waste is not waste.

CHAIRPERSON NICHOLS: Yes, that's a very valid comment and I spoke too glibly, I suppose. What I was really thinking about when I made that comment was that we have, in our own state, large amounts of biomass that is lying around on the ground in fields and forests, which it isn't worth anybody's while to collect, and which is a cost to dispose of.

And there are other types of things that are currently being disposed of where it would seem to me that an investment in figuring out how to use those productively would be a valuable thing to do.

But you're absolutely right that in today's economy and in our really wonderfully complicated society that we have a lot of materials that are waste to one person and a raw material to another. And just shifting that to fuel isn't necessarily a good solution.

So, thank you for that comment.

Hi.

DR. KAMMEN: Hi, Mary. Dan Kammen. With both you and Jim here, I wanted to ask something that's a followup from the AB-118 Advisory meeting we had last week.

And that is that meeting was surely useful for me to figure out how the roadmap's going to work between the agencies and how the dollar figure is really more like $200 million, and et cetera, et cetera that Jim mentioned.

I wondered if you could sort of collectively highlight for the audience a little bit about how you see the interplay of the funding positions going forward, because that, I thought, was particularly useful in that Advisory meeting to think through what types of strategies, what bit of research, what bit of loan and other market guarantees would go on, since we're talking about a lot of investment now, and a long term to plan these out.

CHAIRPERSON NICHOLS: Are there any legislators in the audience?

(Laughter.)

DR. KAMMEN: So I shouldn't have asked that?

CHAIRPERSON NICHOLS: No, no, the first comment I'm going to make I really would have made to any legislators who happened to be here, which is that right now what I'm hearing is that there's a very strong desire, at least on the part of the Senate, to take any money that's generated under 118 and use it for other purposes.

And given the state's economy right now, I think that's a serious risk. So all of us who worked hard to get 118 passed and signed have a vested interest here in trying to make sure that we have some money to spend on the priorities that we do establish.

Having said that, you know, I think the struggle has always been kind of at high level. Do you put your priority on reducing dependence on petroleum with anything you can throw at it, and hopefully not, you know, not do anything that takes you in a bad direction environmentally.

Or do you try to go for the best of the best and focus your funding on those things that look to you like they really are going to be the most sustainable over the long term.

And that is not actually an easy choice to make. And it's not easy to know even where certain things fit on that scale.

So I guess from my perspective research that would help us narrow the range of choices and really try to focus in so we have real choices to make between the long term versus the immediate, would be the most helpful.

So, I think there's time for one more question.

MR. CASSMAN: Thank you. Ken Cassman from University of Nebraska. And I guess my concern would be, in listening to all of this so far, is that California's looking a bit too myopic in the sense that the whole effort could just be lost in a tidal wave of energy demand globally.

So what you're doing here is just shooting far too low outside of this global wave of energy demand.

I mean the big picture is that there's going to be 9 billion people. They're going to be using, on a global basis, probably twofold more energy than we're using now globally, even with massive conservation in developed countries.

And it seems to me whatever we do here in California -- by the way, I'm a Californian --

CHAIRPERSON NICHOLS: Okay, I was going to say --

MR. CASSMAN: -- displaced in Nebraska.

CHAIRPERSON NICHOLS: -- I was just going to say Nebraska --

MR. CASSMAN: But whatever we do here in California must be part of a global solution that provides enough energy to insure that human population is able to plateau and stabilize at 9 billion, which means it's a much wealthier population.

CHAIRPERSON NICHOLS: I think that's a perfectly valid statement. I don't disagree with anything you said. But, to the extent that it implies that we shouldn't be worrying, for example, about the effect on ground-level ozone, that we should just sort of ignore that, I wouldn't accept it.

You're shaking your head, so -- because sometimes when people make those kinds of statements what they mean is, you know, get out of the way, the world is going to overwhelm you, and you should be focusing on the things that are going to be attractive to people in India and China.

And we should be looking for things that are going to be attractive to those people, but as they get wealthier, they're also going to be more concerned about their health and the impacts of the fuels on day-to-day activities, as well.

So, if we can accept that as a friendly amendment to your question, then I agree with it. Thank you.

(Applause.)

DR. JENKINS: Thank you very much. Excellent remarks and excellent answers to questions there. And, Ken, any time you tell California that it's aiming too low you throw down the gauntlet. So, expect something from that remark, I guess.

(Laughter.)

DR. JENKINS: We'll hear also from Axel at lunch and we're going to hear some more from Dan in a few minutes.

And, of course, both Commissioner Boyd and Chair Nichols have given us sort of a clear perception here of what we need to be doing and where we need to go.

But, of course, when we talk about sustainability, you know, it is a very nebulous issue, it seems. And so it's important to get some kind of context and to try to understand a little bit about what we're talking about over the next couple of days, and using this forum as a means to prepare for sustainability standards, actually preparing standards for the state, which will, of course, have regional application, local application, and be globally consistent. So we're not ignoring this issue of the global energy demand, the global energy condition.

And, of course, as my own life seems to

have become rather unsustainable these days, I look forward to seeing the results of these next few days and what we come out of this forum learning and knowing.

With that, then, we'll move along to our next part of the program which will address much more about the principles of sustainability and what's going on elsewhere. And I would ask our panel of speakers, the three speakers, if they would come up and join the table here. And then I'll introduce you one-by-one for your remarks. Thanks.

Dan, Charlotte,, Alison.

And as they're coming up I'll introduce our first speaker who you just heard ask a question, although we seem to have lost our funding now, so -- or maybe in the process -- we may have lost our funding now, so -- never mind.

(Applause.)

DR. JENKINS: Anyway, okay. Dan Kammen is class of 1935 Distinguished Professor of Energy at the University of California Berkeley. Many of you know Dan. He holds appointments in the Energy Resources Group, the Goldman School of Public Policy, and the Department of Nuclear Engineering.

Dan's the Founding Director of the Renewable and Appropriate Energy Laboratory. He's also Co-Director of the Berkeley Institute of the Environment. He holds degrees from Cornell and Harvard, post-doctoral work at CalTech and Harvard. He was Professor and Chair of the Science, Technology and Environmental policy at Princeton University in the Woodrow Wilson School of Public and International Affairs until moving to his current position at UC Berkeley in 1998.

The focus of Dan's work is on the science and policy of clean renewable energy systems, energy efficiency, the role of energy in national energy policy, international climate debates -- I notice you put that debates in there, so must be the science of debating, I guess -- and --

DR. KAMMEN: I wrote it a long time ago.

(Applause.)

DR. JENKINS: -- and the use and impacts of energy sources and technologies in development, particularly in Africa and Latin America.

He serves on the National Advisory Board of the Union of Concerned Scientists, on the Technical Review Board of the Global Environment

Facility. And was coordinating lead author for the Intergovernmental Panel on Climate Change which won the Nobel Peace Prize in 2007. So you and Dan Sperling and a number of others share that Peace Prize.

In 1998 Dan was elected a permanent Fellow of the African Academy of Sciences; and in 2007 received the Distinguished Citizen Award from the Commonwealth Club of California.

So, Dan, if you would, please.

(Applause.)

DR. KAMMEN: Well, thank you, all. It's a real pleasure to be here with such a diverse and talented group working on what I think is going to be the key issue for us for quite awhile now, figuring out a lot of the details that Mary and Jim alluded to.

I want to start off, the IPCC was, of course, a great pleasure for us all, although I noticed at Berkeley what it means for those of us to share the prize, is that we're going to be awarded sometime in the fall a single shared bike rack lock location. So, it's --

(Laughter.)

DR. KAMMEN: -- really a small sliver of

the -- it was just the right mechanism.

So, what I'm going to do today is to talk a little bit about the issues and give a little bit of roadmap to what we're working on. In part, it's serving the ARB directly, serving the CEC directly, as well as working on some federal level issues.

I do want to introduce the team, and I really appreciated the comments that Bryan made in the beginning. I guess I can't laser point to them from the side, but off in italics on the side is Alex Farrell, who I recruited to Berkeley. We collaborated every day; in fact, we had morning and night and middle-day phone calls for five years. It's a real loss.

But this team is a fairly interesting and diverse group. It includes students and faculty working in particular on food and fuel tradeoffs in Africa, on water sustainability issues, on carbon embedded in water. We have a team of several people working only on plug-in hybrid vehicles. Mike O'Hare is a faculty member of the Goldman School Policy where I'm part time.

Several of the students here were also part of our initial EBAMM model, I'll mention later on, that came out before we knew what we now know about all of the indirect land use effects.

And, of course, we have collaborations with our colleagues at UC Davis. We helped, worked together with them on the low carbon fuel standard document that Jim mentioned.

A team at Purdue University and University of Sao Paulo in Brazil. And at ICIPE, one of the organizations people may not know of so much. That's the International Center for Insect, Physiology and Ecology. It's essentially a plant-breeding and sustainability laboratory based outside Nairobi, Kenya.

So we have a pretty diverse team. And hopefully that means that a number of products will be coming out of this mission overall. I highlight many of the papers, including the two big technical documents for the state on the low carbon fuel standard. Those are highlighted; they're the third and fourth ones down.

But all of these are available on the RAEL homepages. And the only admonition is if you, you need to not just Google RAEL, because you'll get the Raelians, who cloned a human a few years ago in Florida, remember?

(Laughter.)

DR. KAMMEN: "Dr. Butterfly" and all that. So you should put in some sort of indicator. I see some members of the team, Rich Plevin has just come in in the back, who I just mentioned. So, you could interact with a number of us on some of these projects.

I start off with the obvious IPCCS diagram since we are not debating the signs of climate change, but we are debating the debaters of this every now and then.

But to highlight in ways that everyone in the room knows, but it is worth reminding ourselves over and over again that the low carbon pathways that we're talking about, the 550 PPM or less scenarios are going to be tremendously challenging on every single metric on there.

And so I've highlighted in grey and in green just some of the options we're talking about. Just to hit the high-end numbers is going to be a challenge, let alone the numbers that we're committed to in California with AB-32 and the 2015 goal, the 80 percent carbon reduction.

So, we've got a huge mandate and we're going to need to make some very rapid decisions as both Mary and Jim said, under remaining uncertainty on some of the technical features. And so it is really going to be a challenge because second-guessing is going to come with the territory on this in a sad, and sometimes unhelpful degree.

I do want to highlight, though, that thinking about energy content and labeling is certainly not new in California. And everyone who works in the state has somewhere the tattoo of California's energy efficiency curve, the decoupling from the federal mean.

But I do want to highlight that those measures of efficiency and energy content, many of which were developed by researchers in the state at Lawrence Berkeley National Laboratory, NREL, et cetera, have made their way very usefully around the world to standards used in a variety of levels.

And while these are based on efficiency, not based on the carbon content of that power, it's not such a massive step to think about what the topic of these three days are. That is how to think about sustainability labeling, and remembering and echoing what both Bryan and what

Jim said in the critical comments, that it's not just about making the energy used being more efficient about it, but it's also about total reduction. So it's not just miles per gallon but it's also dramatic reductions in total vehicle miles traveled.

And it's easy to get caught up in one's pieces individually, I'm going to say it now and say it again. In fact, one of my favorite cartoons is a map of great cities of the world and they're all just traffic jams. And so thinking about not just making those vehicles more efficient, but really significant reductions in the need to use vehicles at all is going to have to be part of the equation.

The topic for these days is to think through a number of the details, and to share the methods and methodologies to evaluate the whole range of issues that we know have to be part of that sustainability matrix.

We need to think about the energy security issues. As we heard both Jim and Mary say, is it just about any fuel that reduces our petroleum use as a first step. And we'll try to clean them up later on. Or is it about getting those that meeting greenhouse gas, as well as energy independence targets early on.

Land erosion, pesticide, eutrophication, sort of the newly raised issues of some of the incredible problems of invasive biofuel species and biodiversity. Water sustainability, of which many people in the room are working on. And we have a fairly good-sized team within our UC Berkeley group. Soil conservation.

And then the ones that if you think those were hard to quantify, the range of social targets that make this job even more difficult. How are we going to put on a reasonable metric. The issues that have to do with community livelihoods and not just simple food/fuel tradeoffs, but sustainability of villages and all.

And I harken back to Mary's time at the USEPA in the real debates that went around, not just adding of value to a statistical life, but then the efforts that have gone on in the WHO and elsewhere to talk about various metrics that were very controversial at various times. But for all their problems, have helped us go a long way in trying to find some common metrics.

And we're going to need common metrics

across essentially everything on this screen. It's going to be a real challenge.

I submit that the only thing we know well about all of these is quite obvious. And that is we're going to have to be tremendously transparent in the data. Because the debates are going to persist; they're going to be critically important. And if we don't lay these things out in a very straightforward way we'll have trouble getting there. And I'll return to that at the end in a little bit of work we're doing for the state on some of the carbon footprinting.

So as we think about where we're starting from, it's, of course, our overall fossil fuel diad, and so this is the boring version of the graph that shows the amount of oil we've used so far, the amount of conventional oil, highlighting the peak oil story, the unconventional oil, the conventional natural gases, et cetera, et cetera.

And while we may or may not be at the peak oil point, we're certainly very very far from the peak dirty oil point. And that's going to make these jobs a challenge for reasons that we deal with every day. And as oil prices go higher and higher they may open the door for the cleaner options. But what they also do is they make the exploration and the efforts to recover dirtier and dirtier fossil fuels all that much more challenging. It going to make our job very difficult.

One of the poster children for this is the Alberta tar sands. Here is the great monuments of sulfur that are being created with the waste sulfur that's bound into the bitumen. And I highlight this for a couple reasons.

One is that while tar sands are coming online at a dramatic rate, in fact Alberta is roughly a decade ahead of schedule in ramping up production to over a million barrels a day, the more interesting version of that curve is one that my colleague, Alex Farrell, created.

And what it shows, to the left of the axis is the carbon signature of all of human history's fossil fuel use. That's the roughly 1 trillion barrels of oil that we've consumed as a society. That's the black line off to the left of the axis.

And when you go to the remaining half of the conventional oil you've got probably doubling that signature. And then as you go to oil with increasingly difficult recovery methods, using enhanced oil recovery, using tar sands, gas-to-liquids, coal-to-liquids this graph should worry you in both dimensions.

We go to a dirtier and dirtier mix, i.e., we rise up the Y axis towards fuels that per unit of fuel are dirtier. And the resource gets vast. In fact, when you start thinking about this full unconventional resource base, we haven't used up about half the world's oil. We're about one-fortieth or so.

So the baseline is a huge challenge, let alone the challenges of the cleaner options. And we need to keep that story in mind as we think through the overall impacts.

So one of the new resources on the block is the half-a-billion-dollar grant that we received from BP that I was an author of, and am now on the Executive Committee for, which is charged pretty simply with cleaner and more sustainable fuels. But what I discover, and as many people in the room know, everyone's definition of what is a better biofuel is quite different.

Hence, another reason for that very simple claim that we're going to have to be very transparent about how we do the lifecycle analyses, what we include, how we draw the system boundaries, et cetera.

In fact, the first effort in the graph that many people in this room showed that highlights those dirtier fossil fuels like the tar sands, as well as the potentially cleaner biofuels and other means of transport, is highlighted on this graph here that shows, in red, and I think it's only true colors on this side, so we should all go left, which is a good California to do things anyway.

So if the red is our gasoline baseline, then there's a whole range of dirtier petroleum products. And then there's hopefully a range of cleaner biofuel and other options, including efficiency, potentially including plug-in hybrids, et cetera.

This graph, of course, was drawn before the full indirect land use story became part of the equation. But it starts off on this conversation. And this is a nice place to highlght again what I think was so wonderful about the initial design of the low carbon fuel standard, to set a 2007 target, and then to set a 2020 target. In this case, 10 percent or more better than net reference case.

And I'm going to highlight one thing right here, and I probably -- if you thought you were losing funding, wait till you hear what I've got to say -- and that is that one of the aspects of this story that we're going to have to think through very clearly in a collective analysis is not just how good can we get in terms of meeting or beating low carbon fuel standards, which are going to be very tricky for a bunch of reasons that many people in the room already know, but how do we potentially gracefully weave this into where we need to go in the long term.

And that is not finding ways to subsidize good fuels, whether they're for transportation or stationary. But finding ways to start taxing or building a market for the bad, working towards an aggressive version and a meaningful price for carbon and greenhouse gases in the cap-and-trade, or a fee system, or whatever method you happen to prefer.

That's a much more complicated dynamic,

not only because the economics get tricky, but because some of the very very good subsidy programs that exist for cleaner fuels are going to need to be adjusted in ways as we move towards a price on the pollution externality side.

That is, I believe, where this battle will end up being most critically discussed and fought, and that's going to be very difficult. So if my funding is now gone by saying that, I'll just retire now.

(Laughter.)

DR. KAMMEN: Again, that's the graph without indirect land use change. So the project that we worked on for most of 2005 was to develop what we thought was the fairest and the clearest assessment of biofuels.

We did it in a way where we produced an online model called EBAMM. It's downloadable. As of last count it's had -- Rich, do you have the roughly -- I think it's well over 2000 downloads, but it's hard to keep track of the overall totals.

So this model remains a downloadable site. It's available there on the RAEL website. And the story that we're now consumed with, of course, is this short little sentence: Additional environmental metrics are now being developed for biofuels and a few have been applied to ethanol production. But several key issues remain unquantified, such as soil erosion and the conversion of forest to agriculture.

So, this indirect land use story, which is now really occupying the efforts in our group, the critical place to go next, in fact, the papers by searching Fergione and Tillman and others are a critical part of the story.

I'm particularly a fan of the carbon debt analysis that I urge you all, those of you who haven't poured over it in detail, that's in the Fergione and Tillman paper, thinking about what is the carbon debt for various pieces of land. It's essentially for a piece of biofuel-producing real estate you now need to know the genealogy of who was its mother and father.

So our initial analysis and the EBAMM model tend to look like this. It was hopefully a correction, although we certainly received some criticism for correcting other authors' numbers in some way. But it was a correction of the existing data, and that's what we found without the indirect land use story.

And recent analysis, again by Rich and by Andy Jones, two of the principal students teams on this, was that what may actually be the case are the total impact with the indirect land use effect may, in fact, dramatically swamp the initial numbers we've looked at.

All of these numbers are still in debate. There's a cottage industry of Princeton just defending their initial paper. There's everyone's analysis going full speed on this.

And, again, I highlight the most trivial point as the central one. The vital piece has to be to do this as transparently as possible. That's actually why we made our full model in Excel available for download. And we're not fielding so many anymore, but for awhile we were fielding a pretty steady stream of questions, and sort of friendly or unfriendly challenges to data. That's going to be a critical part of the process.

That said, the biofuel believers and the biofuel complete skeptics remain. And so I'm not going to go through each individual bar on this, but this is an analysis done by Lee Lynd and his team at Dartmouth that highlights one view that with much better production methods, much better processing, better vehicle efficiency, replacing all corn, for example, with miscanthis, one can think about a biofuel-powered society with dramatic amounts of our transportation fuels coming from biofuels.

Others, of course, contest this dramatically. The other version of this is essentially -- little clicker challenged here -- is essentially that the biofuels that not only we want to use first, but that the biofuels we're likely to value for a greenhouse gas metric at all, are likely to be those that have zero impact on arable land.

The waste stream biofuels, the not only not ag land biofuels, but the nonarable land biofuels. And in potentially some cases where we may be able to combine some amount of restoring degraded lands is one of the few opportunities to get better agricultural yields and better biofuel yields at the same piece of land. I have a team of students working in East Africa and in Kenya and Malawe and in Zambia on this. And we're right now looking at some of the numbers.

This was a graphic that was killed by the PC-to-MAC conversion, so my cute little graphics produced by Andy Jones are not visible. But this is essentially the roadmap to thinking through that indirect land use story.

One of the ways to think about it in a little more detail is that if the operational baseline of a biofuel, let's take one here that, for example, is better than gasoline, if you ignore that indirect land use effect, comes with an initial slug of carbon. That's the indirect land use part of the story.

In the search analysis he amortizes that slug over 30 years. As an IPCC member I would, of course, want him to use the 20 -- 100-year timetable, but it's a reasonable number. And part of what this sort of analysis leads you to right away is to think about a set of policy options that are quite dramatic and are going to be part of the conversation.

One could think about certifying fuels a the only way to go. This is the fair trade coffee version. So this is the land use genealogy approach, which has some real merit.

Another one is that there is going to be a market payment, for example a international agency, a company, state decides they're essentially going to pay off that initial indirect land use slug as a way to make the longer term biofuel more sustainable.

And there is the zero tolerance policy. This is the don't-do-drugs policy. This is simply no biofuel from arable land anywhere anytime.

So, all of these need to be looked at. And, again, some of the analysis we're doing with the evolved versions of not only our EBAMM model, but also work that Andy and Rich and Mike O'Hare and Margaret Torn and myself are working on in terms of using the FAPRI (phonetic) model, and others, to think through the agricultural commodity parts of the markets.

There's a number of ways to think this through. And, of course, one of the emerging issues is going to be the water story. And so, again, as I mentioned before, we have a team doing it. And I look forward to some of the talks that focus on the water story, as well.

The water intensity of biofuels, as well as the carbon intensity of the water we move around to grow them is going to be a critical part of the analysis.

And just to give you a highlight number

for those who don't work on it full time, the first lines are the only ones you need to look at. The water intensity of California ethanol is dramatic; it's on the order of 1000 gallons of water per gallon of ethanol.

This is a huge number in a dry water crisis state in the first place. And we're going to see versions of this cropping up to different degrees in all manner of locations. Brazil claims exemption by climate, and we'll see how much those exemptions really are true or not.

Again, this is work by Kevin Fingerman, Margaret Torn and our group, as well, thinking through these topics. And, again, we'll return to those later on today. I'll skip over that because I know I'm close to the end timewise, if I could operate my clicker.

I just want to highlight that while we're thinking about biofuels primarily here, we not only need to think about, as I said, the reduction in overall VMT, but also some of the other options on the table.

And so thinking about options like the plug-in hybrids are very attractive -- if I could operate the clicker. What's shown here is just start at the top left graph, that shows the California diurnal electricity demand cycle.

And what I've used to fill in that nighttime dip are three difference scenarios with plug-in hybrid vehicles charged up exclusively at night in California. And the red line is with 1 million plug-in hybrids on the road. Then there's a 5 million and a 10 million case. The 10 million case sort of fills in that nighttime low.

And if we take advantage of California's nighttime wind resource and some of the offpeak power, you can think about some low carbon ways to charge up vehicles. Right now it's about $6000 to $10,000 per vehicle to have a plug-in versus a regular hybrid.

And then there's all kinds of other exotic charging scenarios. Everyone charges in the evening, sort of improperly. And then the bottom right curve is the SUV owners charge them whenever they damn well please.

(Laughter.)

DR. KAMMEN: So this is the convenience ugly charging. But you can find various ways to incentivize that. And since we have key regulators here, one can define some pretty stiff penalties to put in place of that.

So, highlight a version of this. One of the models that our lab has developed, called the Switch model -- a recent doctoral student, Mathias Fripp, is the primary author -- and this shows real-time price data from back when California had a functioning market. Our regulators remember those few minutes well.

(Laughter.)

DR. KAMMEN: We took data from 2003 to base it, very briefly. But what this highlights is a high renewables case. And so what we're looking at here is a deploy model that builds new renewable capacity that upgrades grid lines and that builds little bits of storage in the model so the blue is utilizing wind and the yellow is solar; the grey is utilizing fossil fuels.

And then the legend on the side shows hundreds of thousands of plug-in hybrid vehicles being charged up in various cases.

And so one thing we will be rolling out over the summer, as a user -- hopefully pretty user-friendly model, is a California and then next a western grid model that allows you to set some of the conditions. To put, for example, very very steep barriers for building new transmission in terms of price, as well as the time to get it built.

And what we're finding in a first couple passes is pretty interesting. And that is that yes, you need to build some amount of new transmission. But it's far less than many of the models thought if we take advantage of the regional ability to harvest wind and solar, both CSP and some photovoltaics. And think quite hard about what would be the mix of deployment decisions you get if you truly were to be building out a system designed to meet the state's low carbon standards for its stationary power, but integrating in your vehicle charging plans to this right now.

And so, again, this model, the Switch model, will be available on the RAEL website fairly soon, as well. And, again, we can talk more about that later in the meeting.

I'm just going to end up with that initial graph showing the range of carbon contents, greenhouse gas contents of not only our biofuels and the dirtier fossil fuels, but a number of the electric options to charge up vehicles hopefully using offpeak and low carbon power. But we'll certainly be exploring many of the bad ways to do it.

And then, again, ending up with the last story, and that is that many of these issues, while we analyze them here, are going to hit home very much earlier in many of the developing country markets where they're already thinking hard about how will they play in this world or not.

And so something also that we're doing right now is to look at what I would call dual use in a non 60, 70 cents dual use crops, that by investing in properly you can get better food yields, potential biofuel yields, and increasing overall sustainability of the agricultural system.

There are not many places in number where you can do that. But subSaharan Africa is one of the areas where you really could get some significant benefits. And, again, we have a fairly large team working on those areas.

I will just simply end by a map that we all hopefully know, and again have tattooed somewhere, that highlights a number of states that are doing versions of this, and are likely to follow and partner in a number of ways. We certainly need a few changes at the USEPA.

But there's a number of stages of this that will allow these processes to spread. And, again, part of what we're going to need to do is to make this analysis as broadly usable and as broadly transparent as possible.

I'll just end with that slide for the coolCalifornia.org, a initial version of the carbon calculator. It's right now available for open comment on the datasets, the methods, the sectors. I'm hoping that this sort of free exchange of the lifecycle analyses is going to be part of what moves forward from here.

So, thank you very much.

(Applause.)

DR. JENKINS: All right, thanks, Dan, for that excellent presentation. We're going to hold questions until the end of the panel to give our speakers a chance here.

So, our next speaker is Charlotte Opal. Charlotte coordinates the Roundtable on Sustainable Biofuels at the Energy Center at Eole Polytechnique Federalede Lausanne. She is the co-author of Fair Trade Market Driven Ethical

Consumption, and I apologize for the pronunciation. You can say it better than I can.

For the past four years Charlotte's worked in the business development and new product development at TransFair USA, the fair trade certification and marketing agency in the U.S.

And she currently serves as Chair of the Standards Committee at FairTrade Labeling Organizations, FLO, International, the international multistakeholder organization governing fair trade certification.

She earned an MBA and a masters in philosophy and development studies while a Rhodes scholar at Oxford University. And a BA in economics at Wake Forest University.

So, Charlotte, please.

MS. OPAL: Thank you very much. Good job on the French, as usual. I'm an American, so no worries about my accent hopefully.

Thank you very very much for inviting me. It's good to be back in California. I was living in Oakland for three years doing fair trade stuff. Thank you for the -- coffee.

Now, I live in Switzerland coordinating a global roundtable on sustainable biofuels. Who has heard of the roundtable on sustainable palm oils, roundtable on responsible soy? Okay.

I'll just quickly explain what the concept is. It's not a one-time event discussion; it's an ongoing dialogue. The World Wildlife Fund, a few years ago, looked at the top commodities that were destroying our planet, and decided to bring the big buyers and users together with NGOs and producers to come to agreement on sustainability standards for better practice, implementation, for a mainstream improvement on practices on social and environmental criteria.

And we have shamelessly copied the idea and created an uber roundtable for any feedstock. So the idea is there's no leader, it's a multi-stakeholder model with NGOs and small farmers, large farmers, governments all around the table working on this together. So we don't have a lot of time to not reach consensus.

We are not global, but international, multi-stakeholder initiative housed in a country that is going to be neither a big producer nor a big consumer, hopefully a neutral platform, at a university, the Swiss Federal Institute of Technology.

And much as was said earlier, we're aiming to develop some maintstream sustainability principles and criteria that are easy to implement, cheap to certify, accessible to small farmers, flexible and adaptable to new information. As was said earlier, the science changes every second.

And then ideally something that is compatible with the World Trade Organization rules which could mean that a government could use the standard for their own procurement policies, or even to promote different sustainable fuels over nonsustainable fuels.

We're using something called the ISEAL code, which is an alliance of social and environmental labels that has a code of good practice for -- that would make it WTO compatible.

We have a big steering board. I have flyers out where you picked up your badges. I got here late so you might not have seen that. Alex Farrell was one of our founding board members, and a real inspiration to our work, to have the science be the basis for everything that we do. And it's a real shame not to have him here today.

Barbara Bramble from National Wildlife

Federation is another one of my bosses, sitting over here. In the audience we have several volunteers in our working groups, as well. So, thank you to everyone who's been contributing.

UNICA, who's also in the audience today, the Brazilian sugarcane ethanol industry association, also just joined our Board.

So, one of the things about the ISEAL code is that everything we do has to be transparent and open and multi-stakeholder. So, we're doing a whole new way of standard setting involving a WIKI. The bioenergy WIKI, which means people can go on and change wording, comments about the standard. They can put up an interesting paper that they read that might highlight specific new information.

And those discussions, we are dividing the principals into various work areas, greenhouse gas, lifecycle analysis, environmental impacts, social impacts, and then the implementation.

We have almost 300 people from about 40 countries signed up in those working groups. About 30 percent of them are from North America, so a lot of NGOs and biofuel importers. And some local government agencies from Canada and America.

Not a lot of farmers yet, but we'd like to work on that. And a lot of academic experts, as well.

So, we meet virtually. We don't have any global meetings. We're online, and on the WIKI, and the teleconferences. But to complement that English high tech activity, we've also had regional stakeholder meetings.

Except in America, which has a lot of land, most of the biomass that will be consumed in rich countries will come from tropical countries. And so they have to be involved in the discussion about global sustainability standards. It can't just go on here in the north.

So, we've had three meetings, one in South Africa, one in Brazil and one in China. We're having a meeting in India in two weeks time. And the idea there is to bring in local farmers, local government, local experts, small businesses to discuss the standard which feeds into the global process. So the combination of a global and local process.

And we just signed a partnership with the InterAmerican Development Bank who will try to integrate the standards into their own work, so we'll have a lot more activity going on in Latin

America, especially.

It's nice to be able to talk fast, all I do is -- I hope everyone's keeping up.

So, what does everyone want in the standards. So, we had a year and a half ago an exploratory meeting. Basically it was at that time a perfect storm of NGOs, broadly, who saw biofuels as not just a solution to climate change, but also a potential job creator in rural areas, especially in tropical countries.

But also industry. On the transport side, biofuels are the only low carbon liquid fuel option. And also major investments have been made in liquid fuels and also obviously biofuel technologies.

So there was a perfect storm on all sides of people that wanted to make a sustainable industry and saw that sustainability standards were needed to protect this industry and keep it away from being mired in controversy.

Now, cut to the chase, a year later we've seen a lot of NGOs, especially in Europe, but I think increasingly here, as well, calling for a moratorium on biofuels. And so the landscape has changed.

But there are still, and especially when we go to developing countries, producers see this as an opportunity for them and small farmers and NGOs that work with small farmers see still some opportunity.

So, we have a year timeline to create this standard. And so what we did was there has been already work going on in country levels in Holland and the U.K. and Germany, here in California, that there have been some principles that CARB had put out. And then we copied other sustainability standards like the Forest Stewardship Council, the roundtables on palm oil, organic, et cetera.

And we pulled them all together into a first draft that we launched about a year ago. And in two weeks time is our deadline for coming up with the final agreed draft, which is why I look so tired.

But the major themes are following national law; and so that seems like a basic one. Labor rights, minimum core ILO standards. Also water rights. We're seeing in some countries people now irrigating upstream and not -- I don't need to talk about water rights in California.

Land rights, we're seeing new biofuels projects go in with kind of shady claims on land. And tenure problems and not a lot of consultation locally about what might be indigenous land rights. So national law and international law has been one fundamental principle.

Achieving that and understanding that leads into our second principle which is community consultation. So, if you want to go in and put in -- this is mostly for new projects, but what kind of jobs are we going to be creating; are we going to be bringing in a lot of migrant workers; where are they going to live; where are they going to be schooled. Are you creating local jobs and local environmental -- or social benefits.

All of that is a healthy way to do a new projects. And so that's become a major principle that probably came out of the Forest Stewardship Council principles, but also the sustainable palm oil roundtable, as well.

Again, on the social side, as Dan mentioned earlier, one of the drivers -- we have three main drivers, let's say, for biofuels. One is greenhouse gas implications; one is energy security; but especially in the south, and even in the north, one of our policy drivers could be that we're bringing more jobs and income to rural communities.

So that's been a major principle that we've been working on, as well. And also the idea of food insecurity. The only true lifecycle principle that we're following is our climate change principle. And I'm going to go into detail a little bit on that because I think we have a lot of LCA nerds here in the audience.

On the other principles where the scope is a lifecycle approach but it's not a typical LCA, it's really minimum performance standards, focusing on the parts of the chain that have the biggest impact, which is usually on the farm. It can also be in the processing facility if we're talking about effluent treatment, maybe some worker rights. But for the most in-depth lifecycle approach would be on the greenhouse gas side.

And then finally the sustainable agricultural principles around environment, so what's in the 25x25 broadly. So this is hopefully nothing new.

The last principle on technology, some

discussions revolved around the use of biotechnology of GMC, especially. We don't have a moored position on the use of biotechnology, only that it has to be done responsibly within international protocols and transparent.

Now I'm having problems -- I was so proud -- okay.

So, as I said, across the board we're looking for a minimum social and environmental criteria via a very low-cost verification system. We had our call a few weeks ago, and I was surprised that the industry really wanted to move towards real third-party certification, biofuels, even in the U.S.

Biofuels are being held to a very high standard, and any claims about sustainability there is a strong wish to have them be really backed up by third-party audits.

What we're doing is creating a very generic standard so the idea will be that we can then benchmark other certification systems so that if you already had some sort of certification or if your state has excellent verification, you don't need to get it certified again.

And then so beyond those minimum

criteria we also want to figure out a way to incent the better biofuels we've been talking about, those with really good carbon benefits. And also maybe job creation or excellent biodiversity practices.

And then these three -- this is also broadly based on Alex Farrell's work, and also what's going on in Germany, reducing pressure to use new lands. There's a lot of uncertainty around the indirect effects. Those are within our scope. We can't pretend that they're zero. But I would posit that these three maybe have no indirect effects.

The degraded lands, which Dan has mentioned now. One man's degraded land is another woman's goat-grazing area. So obviously we need to have really strong, good, robust definition of these lands and identification.

And we can also say that maybe that land would have come into production as we reach 9 billion meat-eaters and we bring more and more into production. But we could possibly find some true degraded land and put biofuels there.

Obviously using waste materials, again, carefully defined. And then improving yields on existing lands. There's a lot of room to do that in Africa, especially. Better seeds and basic things like irrigation.

So, the visual here is this red line across the board, minimum criteria. But then defining these kind of better fuels, better green practices, and somehow incenting companies to move and buy better fuels over time, you know, maybe higher percentages of these fuels over time. Or maybe a consumer label might require five out of ten scores in the green area, that sort of thing.

But the idea is that you can't trade off a fantastic greenhouse gas balance if you're using child labor. You have to be above the red line on all of the principles.

Okay, so I'll just very briefly talk about our greenhouse gas working group. Some of these names will be familiar to you. Bruce Dale from Michigan State is our Co-chair. And we have some more Americans. Jean Francois Larive from the European Fuel Association for Environmental, don't know how you -- the acronym for it -- is here, and he'll be speaking later.

Who else do we have that you guys would know? Michael Wang from Argonne.

So we have, as I said, each working group might have 150 people in it. So what we've done is made small expert groups that are multi-stakeholder that kind of help us bring proposals to the broader working group.

This is the principle on climate change. It's a well-to-tank analysis. We're not looking at the vehicle technology. Including specific reference to indirect facts, indirect land use change.

We're not going to make a new LCA tool. Rather we're just going to kind of rate indicators for acceptable LCA tools. Things like transparency of methanol -- et cetera. But we will make some recommendations about what are the main key factors that an LCA must include on the greenhouse gas side. What are the main drivers; what are the things that we could maybe leave out, or take default values.

We're going to make a recommendation on co-product allocation, which I'll get to. And then we're going to try and tackle the direct and indirect land use change effects.

And we're now working closely with G8 Global Bioenergy Partnership which you'll hear from later. So, they have the exact same workplans. We're now working very closely with them to try to get more of our multi-stakeholders into what is a multi intergovernmental process.

Okay, obviously recognizing IPCC, which I thought would not be controversial, but sometimes it is. We've been discussing this -- methodology. We've accepted a functional unit. So, I mean, the point of showing you all this is that if we can closely align with what CARB is doing, there is already global consensus on a few basic key elements. And you don't have to go through all of this again, I would posit.

What else is interesting on this. I don't think anyone from the U.K. is presenting here today, but the way they've approached their policy is to have a generic methodology and different default values. So if you don't know anything about your chain, if all you know is you buy vegetable oil off the open market, you get a default value for that chain. If you know it's vegetable oil from -- or if you know it's soy, then you get a different default value; it's a little bit better balance probably.

The more information you have the more

drilled down you can go; the better carbon balance you would get. The idea is that you don't have to go all the way to the farm level and measure how many bags of fertilizer they use if you can't do it.

So they're setting those default values very conservatively. We think that's a very practical approach to implementation for companies to start to get more trace-ability into their supply chains.

Unfortunately, especially on the fertilizer side, there's a lot of uncertainty. So it might be that we eventually do want to go all the way to the farm. But the U.K. model and the Dutch, I believe, are also adopting this as a very practical way to implement in the interim kind of average values so that you don't have to do all the expense of really investigating and doing a full LCA chains.

This is our coproduct and byproduct treatment recommendation that we would use substitution or system expansion. If it's an energy coproduct you can allocate by energy content and market value could also be used. I'm a nerdy economist so I don't know why market value is -- but, unfortunately, different substitution, obviously you can analyze one chain in three different ways, and get three different results.

So, we're going to have to drill down to guidelines about what kinds of chains might be more appropriate to use substitution, and how much information you need to really get a good result there.

I encourage anyone to join our greenhouse gas working group if you want to learn more about this.

So, as I said, in two weeks, June 9th and 10th, we have our steering board meeting where this first round of principles and criteria, including greenhouse gas, but also environmental and social criteria will be approved.

We're going to be talking about governance. I would not be surprised if we decentralized a lot of the process of these global standards. Then would have kind of probably a North America translation to them of the issues that are important for your supply chain. So maybe child labor is not a problem, for instance. But, again, that will be kind of in the next phase, the steering board will decide.

And then pilot testing and supply chains that maybe have never been looked at, some things like jatropha or sweet sorghum, crops of the moment. And then helping getting these adopted in different public and private sector purchasing requirements or financing requirements. We're already talking to some banks, as I said.

Talking about better practices for these new crops that no one's ever thought about before, like jatropha. And then creating a kind of generic standard that could be used for things that are mined, you know, algae, or some other of these things that we don't know a whole about.

And as I said, indirect effects are part of the scope, but we're absolutely not trying to do this on our own. So, what we've seen is that the discussions that are going on in the north have these implications for countries that still have forests, or that have good, you know, food security problems. So they need to be at the table.

And we haven't seen a healthy international dialogue yet where there's space for that. So whatever we can do to make that happen, integrate what EPA is doing, what, you know, California and different universities are doing with what's actually going on in Brazil regarding and use changes. We would love to make sure that that happens in a healthy way.

Okay, thank you very much. I'll be here all week. I look forward to talking with you. Those are our sponsors.

(Applause.)

DR. JENKINS: Thanks, Charlotte, for that also excellent presentation.

All right, our next speaker is Alison Goss Eng. Alison is the Lead for Sustainability Research and Development Programming for the Biomass and Bioenergy Program at the U.S. Department of Energy.

Alison received her PhD from Purdue University in earth and atmospheric sciences, and has a background in terrestrial ecology, hydrogeography and human impacts on water resources. And fortunately there wasn't any French in that.

She currently serves on the Interagency Sustainability Working Group under the Federal Biomass Research and Development Board. The group is charged with identifying a set of sustainability criteria and indicators for biofuel production that can be used across the U.S. Government.

Alison is also a member of the U.S. Delegation on the Global Bioenergy Partnerships, Greenhouse Gas Accounting Workgroup, and represents the Department of Energy on the Council for Sustainable Biomass Production. That's a multi-stakeholder group developing biomass and biofuel sustainability principles and standards for the production of feedstocks for second generation biorefineries.

So, Alison, if you would, please.

DR. ENG: Good morning, everyone. So, part of the session was presenting what is sustainability. And I wanted to get to how sustainability is really applied, and tell you a little bit about what the biomass program at the Department of Energy is doing. Kind of our perspective on sustainability.

So you've probably seen this figure many many times, ad nauseam. The three components of sustainability and sustainable biofuel production, incorporating and promoting rural livelihoods and rural economic development. Also focused on this new industry and promoting, lowering the costs of producing biofuels.

And what we're probably focused more on today, the environmental impacts of biofuel production, in an era of trying to really boost our production over the coming years in response to federal legislation.

So our vision in the biomass program at DOE really incorporates all three of these components. We want to enhance U.S. energy security and reduce our dependence on foreign oil, which is more of a social concern.

But we also want to promote environmental benefits and minimize any negative environmental impacts of biofuel production, including reduced greenhouse gas emissions. And then while doing that, create economic opportunities across the nation.

So I actually was brought into the department to really add a sustainability focus. But prior to my coming there was already a focus at OB -- the biomass program, on sustainability. It is a renewable energy program. DOE is organized around energy efficiency and renewable energy. And we have programs that focus on all different types of renewable energy technologies.

But my program in particular is focused really solely on moving away from a starch-based feedstocks and towards cellulosic or second-generation feedstock production.

The DOE biomass program is not really putting any money or research towards starch-based or first-generation feedstock production. It is really focused solely on non-food based feedstocks.

We also focus on enzyme development that is more cheaper, but also more efficient and decreases waste. And integrating the entire biofuel production lifecycle so that we're really looking at a systems perspective.

The program is organized from feedstock production through conversion technologies into integrated biorefineries, and through to infrastructure. And so due to that organization we're really able to have a system of more sustainability focus on biofuel production, in particular. And as I said, really focusing on high efficiency and lowering waste.

So I wanted to take you quickly through some of our different projects and areas that we have been able to leverage off of work that other federal agencies are doing, NGOs and so on.

You're heard today partnerships and collaboration over and over again. And that's really core to any type of focus on sustainability.

So we are, as I said, really focused on second-generation, developing diverse, nonfood feedstocks that require little water or fertilizer, or other chemical inputs. But we're also focused on forestry practices, and sustainable forestry. And as was mentioned earlier today, using woodwaste and even dedicated woody energy crops in responsible ways.

Other agricultural waste we're certainly focused on, as well. Stover and wheat straw and other more conventional types of ag residues. Harvesting those in more sustainable ways. And I'll talk more specifically about work we're doing in that area. Insuring that we're not removing so much of the residue that we are causing negative environmental impacts, and affecting soil health and future yields.

And lifecycle analysis is, of course, a big component of the work we do. Looking at not just greenhouse gas lifecycle, but also issues of water use and impacts to land use and soil health.

So, on the indirect land use issue, in response to the science articles, but also our Energy Independence and Security Act, mandated us to look at this issue of indirect land use. And we're working with Purdue, along with Argonne National Lab, on developing new analytical tools to address how well this increase in biofuel production mandated by EISA, which we call it in D.C., affect indirect land use. How are these two phenomena connected.

In climate change we've been working with NREL, the National Renewable Energy Lab, for several years on lifecycle analysis. Pretty run-of-the-mill greenhouse gas emissions accounting. The scale-up of biofuel production, and what the greenhouse gas impacts will be.

One project that we just started this year, but I'm certainly very excited about, is the partnership with Conservation International that really has three components.

The first of which is looking at a global assessment of feedstock resources. So where are our high-value feedstocks currently located; and what is the potential for new production.

The second is a more focused work in Indonesia, as well as Brazil, to identify how are these areas where we could grow biofuels, how do they overlay with high biodiversity areas and other high carbon and other high value areas, so that we can insure that we can protect areas that we deem important.

And then the third component is actually working with local and regional governments to promote feedstock production in the areas where it should be grown, and limit it from encroaching in areas that do have biodiversity value, or other high carbon value.

On the water side, which is of course something I'm very interested in, we're doing lifecycle analysis with Argonne looking at the water demand of biofuels. And really taking a more regional look at it to see across the U.S. what areas can we grow feedstocks under different water availability scenarios and irrigation practices, and so on, to come up with regionally specific water accounting.

And then comparing that to different

types of feedstocks. So corn ethanol, second-generation feedstocks, sugar cane and then competing petroleum fuels that we can then compare.

The Department of Energy is really interested in supporting standards development. And through that, we are involved with the Council for Sustainable Biomass Production, which is a domestically focused multi-stakeholder group, which was mentioned earlier, that's looking to develop standards for second-generation feedstock production. That could then perhaps fit into a certification that biorefiners could then purchase some of the higher value, perhaps more sustainable, feedstock to then process.

On the production aspect, we work primarily with USDA in the Sun Grant Initiative, which is a network of the land grant universities, on infield dedicated energy demonstration projects.

So trying to get a better handle on the different types of second-generation crops, and what their environmental impacts and needs are, in terms of nutrient inputs, water inputs. And then what their potential yield and carbon cycling could be.

And as part of that we're developing a tool focusing specifically on corn stover that farmers could then use. Input their soil information, their current management practices, the crops that they're growing, and see how much stover they would need to leave on the land in order to maintain soil health, maintain their yields and the carbon that they currently see.

This is simply a map of the regional feedstock partnership program which is part of the sun grants, those energy crop field trials I was talking about. And these are focused primarily on the herbaceous energy crops. We'll be adding a woody component, both with residues as well as dedicated woody energy crops, to this in the coming years.

And as part of this work we will have a focus sustainability component, the watershed scale, looking at issues of nutrient runoff and water cycling and so on.

A couple cross-cutting efforts I want to mention. One of them is the National Bioenergy GIS, which is a pretty large project. We're working through many of our national labs and also

UC Davis is a partner on this.

We're developing a national scale GIS-based framework that's really going to incorporate all of the best available geographic information that is relevant to bioenergy. And provide really a one-stop shop for this kind of data that could be publicly accessible.

Another component of it is really taking, incorporating all of our existing analytical tools, many of which you may be familiar with, such as GREET, the greenhouse gas accounting. And also new tools that we're developing, such as the stover removal tool. And integrating them into one platform that then we could have a really useful framework for those people in many different sectors interested in analyzing both the potential impacts of new policy scenarios, and also looking at areas where new crops could be grown, new biorefineries could be sited, and so on and so forth.

While my program is not directly part of the Office of Science in DOE, you're probably familiar with the bioenergy research centers that were recently funded by the Office of Science.

One of those, the Great Lakes Bioenergy

Center, has a specific focus on sustainability. And it really covers the gamut of the sustainability issues within biofuel production. And serves, really, as a microcosm of a lot of the different research needs in this area. From the field scale, even to the lab scale, looking at the interactions in soil microbes and new feedstocks coming online.

And looking at more macro systems issues of biodiversity, social impacts and also economic impacts of new policies that are promoting the intensification of agriculture, and really the birth of this new industry.

I was doing so good -- okay. So these projects aren't focused really primarily on sustainability, but I would be really remiss to not mention the millions of dollars that the program has put in recent years into biofuel research and development, as well as deployment projects.

And you can see that there are, in addition to a bioenergy research center in California, there are also several deployment projects. We have many cellulosic biorefineries coming online. Of course, range fields down in

Georgia was the first one to break ground this past year. But there's a lot of research, but also a deployment within biofuel production that's coming out of DOE.

And as I mentioned earlier, this Energy Independence and Security Act that was passed in December of 2007 really had a sustainability biofuel focus through reducing greenhouse gas emissions, but also mandating the federal government with EPA as the lead, but then DOE and USDA in a supporting role, to assess every three years what are the environmental impacts of this piece of legislation.

And we're working closely together, the federal agencies, to figure out, you know, how exactly we're going to meet that standard. And Allen Hatch from EPA is going to be talking to you, I believe tomorrow, a little bit about the federal agencies' coordination around this issue.

But, the bottomline is that the U.S. can encourage and promote sustainable biofuel production through smart policies. But also addressing analysis. I mean, DOE, and my program in particular, is really focused on meeting the R&D needs and the gaps in this area around indirect land use, but also many other issues.

And so we do need to have balance analysis, as well as much dialogue across the agencies, but also with NGOs and university sector and everything.

So we promote, of course, open discourse and we believe that we have to work together. But I really thank you for your time.

(Applause.)

DR. JENKINS: Thanks, Alison, for another excellent presentation. Very informative.

I do want to thank our panel for staying on time, here. We have a couple of minutes for questions and answers, I hope. Or maybe more questions.

So, if you have some questions for our panelists, we have a microphone over here. Do please come up and introduce yourselves and present your questions.

We'll get to break in a minute here.

MS. DOMINICIS: Thanks a lot. I am Ariane de Dominicis from the European Commission. I have lots of questions because the three presentations were very interesting.

But just focus on two questions for

Charlotte. First I was very interested when you talked about the ICL -- because in the UN, in the Commission, the debate on the -- compatibility was very important issue.

And the second question is whether you are working on some standards for verification and auditing for the standards.

Thank you.

MS. OPAL: Great, thank you. So just so you know the European legislation does not include any social criteria in their sustainability criteria. And their reasoning was that that could be WTO incompatible.

Our standard can be used voluntarily. So WTO is usually more when it's a regulatory situation requiring, you know, creating trade barriers, basically, based on criteria. So if it's a voluntary standard it's a nonissue.

Using this ISEAL code and allowing especially developing countries to participate in setting the standard is one way to prevent them from then complaining about the standard at the WTO.

So the way we are setting the standard, allowing developing countries to participate and make sure that it is something that can work for them is one strategy to be WTO compatible.

And the developing countries possibly have a lot to benefit because they will have generally higher greenhouse gas balances. So in theory, if the standard is easy to implement, it doesn't present a trade barrier, it can actually benefit them and getting them better market access.

So, our strategy with WTO is to involve as many people as possible so that few will complain at the end.

MS. MONAHAN: Hi, my name is Patricia Monahan. I'm with the Union of Concerned Scientists here in California. And I have a question, I think it's for you, Charlotte, but it might also be for Alison.

There's so many efforts on sustainability going on across the country, Germany, the EU, the Roundtable on Sustainable Biofuels, and I'm wondering how you envision all these pieces fitting together.

Will there be some kind of uber standard, uber certification? Will there be a thousand points of light? And then how will the

U.S., how does the USDOE envision a certification process working here in the United States?

MS. OPAL: I'll take a crack at that. The reason we started was exactly to avoid having multiple standards for multiple markets. And certainly farmers face very, you know, I want to sell this to -- I can sell it -- but I can't sell it to the U.K. And that makes no sense for them to have multiple certification. So that was why we started doing this global harmonization process.

But I think the next phase will probably be to create a North America -- within the roundtable, a North America interpretation. And the idea would be that something like the Council on Sustainable Biomass production could easily benchmark into this global standard and be recognized. And that we could have U.S.-specific indicators for U.S. crops and soil types, et cetera.

So, probably similar to FSC, we'll see regional groupings. That would be probably our vision going forward for these global sustainability standards.

But the idea was to try to harmonize.

DR. ENG: And I can just add that the Department of Energy is currently watching the roundtable and other global standards efforts closely. And we are very interested in opportunities to create voluntary stakeholder supported criteria or standards that could be integrated into the domestic market.

The Council on Sustainable Biomass Production is a domestic focused effort. And it really allows the federal agencies, EPA, USDA and DOE to start talking through some type of voluntary, like I said, stakeholder-supported effort that could then be integrated more globally.

MR. HEISENBUTTEL: Hi, I'm John Heisenbuttel, part of the staff for the Council on Sustainable Biomass Production.

Just a follow-on to that question a little bit, what's really been helpful is the communication between the roundtable on sustainable biofuel and the U.S.-based organization. So I think that's going to help keep harmony.

My question was for the three of you, so that none of you feel left out. And, by the way, Alison, thank yo for the plug.

We talk about how to develop all these good standards. The key, to me, is uptake. Getting them implemented, used.

What do each one of you believe are the key factors to get folks all along the supply chain to uptake the standards or best practices?

DR. KAMMEN: The key, to me, is sitting to my left. And that is that in California, a major market for liquid fuels, we have a number of, I think, very well coordinated efforts at the state level. That some of those will get picked up outside. I think some of those are likely to go ahead regionally first, and then grow.

But not only are the standards, I think they make a fair amount of sense, but the process has been quite open in that.

Sonia Yee is here from Davis. I see Sabrina Spatari from our group, as well, in the back row. But the interactions of individuals back and forth with the lawmakers has been pretty productive.

And as we mentioned in the beginning, there was a fair amount of financial muscle behind it.

So, in my view, there's actually the mechanisms to keep adjusting the science. And also the ways to actually put them in practice.

And so I think within our little corner of the world here, there's a pretty good system. We need to keep the money in the pockets, as Jim said. But I think there is the mechanisms to make that work at least at the regional level.

MS. OPAL: I guess I would say there are two key factors. One is that I think the discussion needs to happen in a multi-stakeholder way to see down the road what are the risks coming up. It's hard to believe that no one thought about the food price, or no one was really talking about the food price impact. I don't think they're very strong, but there are not zero. And so, you know, the more voices we have the more likely it is that we'll see those risks coming down the pipe, and be ready to address that.

And then secondly, that it's easy to access at the very beginning. We're talking about fuel companies that maybe don't have a lot of traceability, even into where their fuels are coming from. But then very strong progress requirements that you could let, I mean, the U.K.

has a don't-know reporting, but you have to phase that out within two years. You have to know after two years where your fuel's coming from, and how it's produced, et cetera.

So, letting people into an easy-to-implement system, but then really pushing them to get full traceability and understanding of the history of their fuels, I would say.

DR. ENG: I would agree. I think that really the areas where the uptake is going to occur is at the policy level. I mean you're seeing what the new Energy Independence and Security Act, but really the people that are being -- their feet are held to the fire, are the blenders. And they're the ones that are ultimately responsible for meeting this greenhouse gas reduction criteria, in particular.

And we've seen, even with this recent increase in energy prices, that the biorefineries in particular are able to respond in ways that we didn't even know were possible in terms of energy efficiency and even water use efficiency.

There was a recent study put out by Argonne that simply was surveying the buyer -- and showed that just in the last few months due to the energy prices, the industry is able to respond if they're given the impetus to do so. So.

DR. JENKINS: We'll take two more questions before we break for our five-minute break, so --

MS. TOMIC: Hi, my name is Jasna Tomic, and I'm with CalStart, which is a nonprofit working on advanced transportation and biofuels, et cetera.

And I think there was one note -- well, first of all, let me comment that I'm very impressed with all the studies that are going on, and how deep and wide we're going with biofuels.

But my question would be how does this compare to standards we have for fossil fuels? And how do we, you know, we're probably going to have fossil fuels until 2030, 2050, 2080, and my own background is actually in fossil fuels, so I know that we haven't done that great of a job.

So how are we going to make sure, I think Dan Kammen made a little note on them with carbon taxing, et cetera, but that we have similar standards, and not completely off.

DR. KAMMEN: So I guess I thought I did more than a little standard on it, I tried to highlight on quite a few slides that --

MS. TOMIC: A lot, sorry.

DR. KAMMEN: -- lifecycle assessment that we're going to need to do. And I think that the bottomline message is that you don't get a free pass.

And, you know, the genealogy of your fuel matters. And the genealogy goes back to its fossil fuel roots, it goes back to its what is the energy payback time, a variety of energy and carbon payback time, a variety of technologies.

We're going to be doing that more and more, but I do think that in the end the hard question isn't going to be doing this labeling. It's going to be this, at some point there's going to have to be a policy inversion that goes from a bunch of interstate, and I think well crafted, subsidy measures for the goods.

And it's going to have to be this externality one that is going to then hit the fossil fuels in ways that, you know, fortunately many supporters of AB-32 here and the laws in Sweden and Germany are going to pull back a little it from where we start to get the full assessments of the fossil fuels online.

So I think that's where we're headed. But we've got to clarify this process first. Certainly doing the fossil fuels is critically part of the story. That's why the slides I began with really highlighted the fossil fuel story first, as the background. Then moved in to the biofuels.

But I agree, it's certainly a plug-in hybrid vehicle running in California is a very different greenhouse gas machine than that same vehicle running in West Virginia and other places.

So there are real issues with even a similar technology of vehicle based on where that fossil fuel or that nonfossil fuel is coming from.

MS. TOMIC: If I can just add, I'm kind of even thinking of things, and not to pick on child labor here, but do we look at child labor in, you know, coal mining or pipelines coming from Chad of oil. And what's the benefit to Chad of providing that oil. Do we look at that for fossil fuels?

DR. KAMMEN: So, not taking this too far afield, but we certainly don't have the best record with the international agencies of making those EIAs stick. And the Chad pipeline is an example where there was an EIA done. It was very negative. It was not following at the World Bank level.

So, we can do the studies. But as several people have questions and commented, we have to have the muscle to put it in place. So, no question, that's got to be part of the process at some level. You can't simply say, well, I'll wait for the Office of SweatShop Management to go look at my biofuels. It's got to be part of the assessment we do here.

MS. OPAL: I just want to quickly add there's a study guide EMPA, which is the Swiss Materials Technical Institute, which has on the X axis the GHG offset, and on the Y axis the environmental impacts.

And on a per megajoule basis the problem with biofuels is that it happens on a land surface and uses a lot of labor. So the potential negative impacts are much greater on a per megajoule basis than something that is drilled.

It just underscores how cheap it would be to fix all these problems for the fossil fuel industry. But I mean I think that's the difference, is the biofuels a promise sustainability, fossil fuels never promises sustainability. So they're being held to a higher standard and their potential negative impacts are so much greater on a per-gallon basis.

DR. JENKINS: One more from Mike, I'm sorry. And maybe you can ask --

MR. THEROUX: Michael Theroux, thank you. This particularly for Dan and to Alison. The DOE and the EPA both have done a good job recently, and Berkeley's certainly been involved in that -- combined heat and power projects on the ground.

I would like to extend that as ask for your comments to extend that to early development projects that will produce biofuels. Those of us on the ground at the municipal, institutional and industrial project development side desperately need your brain trust.

And we'd like to open up something other than a grants- and funding-based discussion that can allow us to present the difficulties that we have, and ask for your assistance in understanding the carbon footprint and the other more detailed issues that you've addressed.

DR. ENG: Well, I mean that's certainly

something that I personally would be open to exploring more. In developing a real sustainability portfolio within the biomass program at DOE, we're really trying to reach out to many different sectors. And try to assess, really, what are their needs in this area.

So, this is a great time for you to really engage, with me in particular, and let's explore this a little more.

DR. KAMMEN: So I mean I'm certainly, I mean you can have our trust. Whether the brains are any good or not, you guys can decide later on.

But, you know, there's a whole number of regional efforts that are, I think, starting this process. There's the East Bay Sustainability corridor where Oakland, Richmond, Berkeley and others -- I'm on the sustainable committees for each one of those cities -- are looking at this.

Alicia (inaudible) at East Bay MUD is doing assessments of their waste conversion process. We run a small, too small, DOE center on CHP where we've been looking at some of these issues, as well.

So the tools are out there. And I think that the one that I'm personally hoping gets a lot of traction is the fact that coolCalifornia.org website, which is a site to go in and focus on the food sector, the sector of transportation and get the CHP part of that dialogue to look at what are the potential gains by converting what are made by just tipping fees now to resource fees.

But those things tend to be best done at a local level because the actual streams are quite local, so you do tend to need to drill down. And so, we're certainly available; and I'm sure the Davis team and others are, as well.

But that's certainly where we would like to see more traction on what's always been a relatively small program at the level of DOE program, passing it through, in this case, the CEC to us. And we run the regional office. We do the California, Nevada and Hawaii piece. There's many now.

So, it's definitely on our agenda. So, we'd love to.

DR. JENKINS: All right, I guess we're done with questions. All right, thanks very much to Dan and Charlotte and Alison for these excellent presentations. The worst thing we can do, of course, is to run out of time for questions and answers.

And the second worst thing we can do is to run out of time for a break. So we now have our two-minute break. I would ask, first of all, if you have questions and you want to discuss this in more detail we have time tomorrow afternoon, in the later part of the afternoon, for a more extensive panel discussion. So make sure you get your questions thought about and get those to the panel. And all the speakers, however many of them, will remain here for tomorrow afternoon.

And I'll ask, if Martha's around, are there any announcements. And if not, then we'll go to break. And come back at 11:00. No, we'll come back at 11:05. Thanks very much.

(Brief recess.)

MR. MANZANILLA: My name is Enrique Manzanilla; I'm with the United States Environmental Protection Agency at the regional office in San Francisco. I'm the Director of what's known as the Communities and Ecosystems Division.

The conference organizers asked me to make sure that everyone knows that the transcripts and proceedings, the presentations, we're recording the comments here today. That will all be available on the California Biomass Collaborative website in about two weeks. So I think that'll be very good, because I think we're going to get a lot of interesting information during the course of the next three days.

Again, I'm from USEPA. And as Bryan mentioned, I was on a detailed assignment with the California Energy Commission from October through April, where I helped the Commission on several areas. But one of those areas was bioenergy. And I worked with folks at the Commission.

It was a great privilege to work with folks at the California Biomass Collaborative on organizing this conference.

Before going to the Commission I was on another assignment at the United Nations Food and Agriculture Organization in Rome. And that's where I really got immersed in the issues related to bioenergy. Where I got introduced to the whole issue of the food-versus-fuel debate. That was very much on the minds, as you might expect, on the folks that work at the United Nations Food and Agriculture Organization.

And they've been doing a lot of work in

that area, as well as part of a tremendous focus on overall sustainability.

So when I came to the California Energy Commission and we came up with the idea of having this conference, it was very important for us here in California to learn about what is happening outside the boundaries of California, outside the boundaries of the United States, for that matter. Because there were a lot of things happening on issues related to sustainability.

You already got a taste of that this morning from the presentations by Charlotte Opal. And I think that's an important thing to bring to the discussion because as California faces some major policy decisions in the years to come, and this year in particular, I think we need to take advantage of a lot of work that has already taken place in the international community on issues related to sustainability and on issues related to the supply cycle analysis.

So I'm very pleased that Ariane de Dominicis is here with us today from the European Commission. She is coordinating biofuels policies at the Director in General for Environment in the European Commission.

Before joining the Commission she worked at the Climate Task Force de Cas de -- a French financial public institution in Paris, excuse my French, on analyses of carbon markets and development projects with the French authorities.

She also worked on a forestry clean development mechanism project in Latin America.

Please join me in welcoming Ariane.

(Applause.)

MS. DOMINICIS: Thank you very much. I'm very happy to be here. It's very important for us to stay in touch with what happens the other side of the Atlantic Ocean on the sustainability bioenergy. And I know a lot happens.

I will try in my presentation to give you an overview of what's going on right now in the EU regarding these questions of sustainability criteria for biofuels.

So my presentation, first I will develop the institutional context, basically as I will explain a bit more in details further on. We have two pieces of legislation right now dealing with biofuels. And sustainability criteria for biofuels will apply to both of these legislations.

And then in the second part I will focus more on what's on the table right now on sustainability criteria for biofuels, and what's being discussed in the different European institutions.

So the first piece of legislation we are talking about is the review of the fuel quality directive. So this European directive was first set in 1998, and it deals with environmental requirements for fuel, suggested rate of sulfur and other components.

And, in general, last year, there was a review of these directive. And the Commission came up with a new proposal, which is quite similar to the low carbon fuel standards here in California. Which is that the fuel supplies to the EU must first report on the lifecycle greenhouse gas emissions of all the fuels they put in the European market. This is starting in 2009.

And second, they must reduce these emissions by 1 percent per year starting in 2011 and until 2020. And this is part of an integrated approach and transport. We have a directive on CO2 emissions from cars that has been proposed before Christmas by the Commission. And now this is the fuel part of the integrated approach.

So, of course, this approach is sustainability neutral. What really matters is that at the end of the day you have to 1 percent reduction. But, it is expected to play a significant role. And this directive is an incentive to use the best-performing biofuels in terms of greenhouse gas emissions, because they make it easier for the fuel suppliers to achieve their targets.

So, after this proposal was proposed by the European Commission, it was discussed in the European Parliament and the European Council. And both institutions stressed that they wanted to have sustainability criteria for biofuels in this directive, as well. So that's the point where we are now.

So the second part of the European legislation that deals with biofuels is a part of what we call the climate and energy package. So, the Commission proposed to have what they call the free 20 percent. A 20 percent reduction in greenhouse gas emissions. A 20 percent of renewable energy, including 10 percent biofuels. And a 20 percent reduction in primary energy consumption. All these 20 by 2014.

And these were endorsed by the heads of state in March last year. And the 10 percent biofuels target, more specifically the binding nature of the 10 percent biofuels targets, was endorsed subject to a few conditions. One of these conditions being prediction being sustainable. And the second one being second-generation biofuels being commercially available.

So, then in January this year the Commission proposed sort of package of directives dealing with the achievement of this three 20s that had been endorsed by the head of states the year before. So we have a directive on the revision of our emission trading schemes, to the big industries and energy production.

We have national targets for the EU member states on the greenhouse gas emissions that are not covered by our emission trading scheme. We have a framework for the development of carbon capture and storage. We have new guidelines on the stated that is granted for environment. We have also things on energy efficiency.

And finally, what's of interest for us now, the directive on promotion of renewable energy. And this directive sets how the 20 percent renewable energy is going to be achieved in Europe. And lays down a burden-sharing of this targets among the different member states, according to several criteria, GDP, renewable energy potential and so on.

So as far as biofuels are concerned, there is in the directive a 10 percent renewable energy and transport targets for each European member states. So it's not a 10 percent -- anymore, it's renewable energy. So you could have plug-in hybrids with wind energy, for example.

But nevertheless, biofuels is expected to play a very very significant role in the achievement of this target.

And this directive also contains a set of sustainability criteria for biofuels that I will describe more in my second part. And biofuels have to respect the sustainability criteria if they want to count towards the 10 percent targets, or towards any of the national targets.

For example, if some member states wants to go further, and have 12 or 15 percent biofuels target, still the biofuels must respect the sustainability criteria. And also to receive financial support, they must respect the criteria.

So it's not criteria on imports. It's criteria on counting to what the target and receiving financial support.

Imports and domestic production are treated equally. That was an important basis for the design of this sustainability criteria. The criteria also apply to bioliquids. So bioliquids are liquid fuels used in nontransport energy.

One example would be palm oil used in the -- station. And the extension of the criteria to all biomass is to be analyzed by the Commission by 2010.

So, now the state of play as for today, there is a clear need for sustainability criteria for both the fuel quality directive and the renewable energy directive. So the Council has set up an ad hoc group which gathers the experts on energy that we're going to work on the proposed renewable energy directive, and the environment experts that were going to work on the fuel quality directive.

And so now they're working together on the sustainability criteria, that they're going to apply both directives. And their work is still underway. They've done a lot of work already. But the parliaments is already also working on that. It's going quite fast, but it's a very very complex issue, of course. So there are still many points remaining to be solved.

So now go in details into the Commission's proposal that was sent last January. So, what are the criteria. The first one is a minimum greenhouse gas saving of 35 percent. This is to be calculated with a greenhouse gas methodology that we'll describe a bit later.

Default or actual values may be used. There is a set of default values in the text of the directive. And these default values are conservative. And if a fuel supplier thinks he performs better than the default values, he can use actual values. But it's to avoid disproportionate burden.

There is an adaptation for existing plants. They have until 2013 to reach this 35 percent minimum greenhouse gas saving. Whereas new plants have to achieve it right away.

The second criterion is the nonconversion of high carbon stock areas. So, the carbon stock area is that where identified are wetlands and continuously forested areas. It's not forest because (inaudible) internationally agreed definitions for forests.

And the idea is you can take raw material from these areas, but you cannot convert them into arable land, for example. You could take woods that you manage your forests and transform it into second-generation biofuels. But you cannot just chop down the forest and then plant energy crops.

Then we have the biodiversity criterion, and the idea here is we have really no-grow areas. In the previous question you could not convert them, but you could still take the raw material out of them. But here it's really you cannot touch them basically.

So there are three types of biodiversity areas in the current text. The first one is undisturbed forests, which means forests where there is no significant impact of human activity.

The second one is protected areas by countries. And in this case you can have an exception, you can take raw material if you prove that it doesn't go against the purpose of the protection of these areas.

The reason for that is in many countries, including in the EU, you have protected areas where you have agriculture, but that has to comply with a certain number of rules. And as long as these rules are complied with, there's no reason why we should prevent biofuels being cultivated in these areas.

And the third type of no-grow is highly biodiverse grassland. There's going to be some work done by what we call comitology, to define and identify these highly biodiverse grasslands.

And the last criterion applies only to the European production. All the European produced by those must respect the rules of cross-compliance. So these rules are some environmental requirements that's European harvest has to respect if they want to receive the money from the carbon agricultural policy. And so this will have to apply to all of them, even if they don't claim for this money.

Now, a few words on the verification rules, which are very important, of course, because -- said the best sustainability energy criterion which you are not able to verify that, actually -- is not really worth it.

So it is the responsibility of member states to insure the verification and to require their economic operators to have a strong, an important level of auditing and verification.

The way of tracking consignments, it is the mass balance system that has been chosen. So basically what it means is you don't have to track every single molecule of biofuels and make sure, that is to say molecule you put in your tank, that you produced somewhere else.

You can physically mix consignments. For example, in the tank of a ship. And then when you ship them to Europe, if at the beginning you had let's say 20 percent of the biofuel that where complying with the criterion, 80 percent that were not, each liter of this biofuel that you are going to take from the ship will be considered as having 20 percent -- being 20 percent sustainable and 80 percent nonsustainable. That's how it works.

So it's not tradeable certificates where there is absolutely no link between what you put in your tank and what was produced. It's not track-and-trace with the molecule, but it's something in between.

And now also something rather important. The Commission can accredit some existing voluntary schemes or agreements. So suppose your voluntary certification scheme is for biofuels. And you cover the criteria X and Y, but not the criteria Zed. And the Commission can say, well, if you have the stamp of this certification scheme, it means that you -- it's approved that you comply with criteria X and Y, also provided that the verifications system is strong enough and so on.

But still you have to prove the third criterion. And once it is accredited by the Commission for a duration of five years, all member states have to accept the certificate as approved.

So, it's a big incentive to use biofuels that are satisfied by voluntary schemes. And, of course, voluntary schemes can also go further than what we do in the directive. That's, of course, completely possible and they can also adopt maybe to some local conditions and so on.

On monitoring and reporting the member states have to report every two years on a number of issues including the development of use of biomass in transport, et cetera.

The Commission has to report every two years to the Council and Parliament on the implication of biofuels development on land use change, on commodity price changes, availability of food stuff, cost/benefit of biofuels, the import policy of the EU, and why they're sustainability and development issues.

And the important thing is corrective action has to be taken by the Commission if appropriate. Of course, this is very large statement, but nevertheless, it has strong implication.

I'll just finish with the methodology for greenhouse gas calculations. So, it's lifecycle. And it includes the direct -- change to conversion of one land use to another one. It compares with petrol and diesel emissions. Applies not only to biofuels, but to other fuels, because of the fuel quality directive. They have to be measured. And to bioliquids.

It's based on the work conducted by the Joint Research Center of the Commission, and I believe this will be presented tomorrow, so I won't go into details.

The energy location was chosen to the -- and as I said before, there are default values that I calculated basically by adding 40 percent to the emissions from processing, while the agricultural emissions remain untouched.

Thanks a lot for your attention, and I'd be happy to answer your questions in the Q&A session. Thanks.

(Applause.)

MR. MANZANILLA: Thank you very much, Ariane. Clearly when I was in Europe I made note, and became very well educated on the importance and the prominent of Brazil in biofuels development. They've been involved in it for many years.

Because we're having a problem with this projector we're going to switch it out. So we're going to keep going so this way that will hopefully look like that eventually.

Anyway, so we're very pleased, because of Brazil's prominence in this area, long-standing prominence, we're very pleased that Joel Velasco is here with us today.

Joel is the Chief Representative in North America of the Brazil Sugarcane Industry

Association, UNICA. Previously he was Managing Director of Stoneridge International, a strategic advisory firm based in Washington, D.C.

And he is a dual-national of Brazil and the United States, fluent in both languages. And he has worked on a broad spectrum of issues ranging from trade to regional security.

Please join me in welcoming Joel Velasco.

(Applause.)

MR. VELASCO: I like the comment earlier about the issue of the left and the right side. I'm a Democrat, so I tend to like that side a little better anyway. Since everybody was saying things earlier that would ruin their funding, I'm not too worried about my funding yet, but I figure I might as well ruin my politics by saying that today.

Thank you, Ariane, for your comments. You know, I think I'll try to focus more on the practical aspects of our industry, since she's given, I think, a very good overview of policy. We've heard already about CEC and CARB's approach on things.

I should also say that I guess maybe I'm the sole brave one who is representing at least sort of beyond California, the ethanol industry. I don't see my friends from the corn ethanol actively here. And I haven't seen my friends from E-Bio, either, here, from Europe. I was with them a few weeks ago in Sevilla. Maybe they didn't want to come to Sacramento.

Let me briefly outline what I'm going to try to do here. I'm going to try to be pretty brief. I've got some other slides we can talk through in the Q&A session if necessary.

But first let me introduce UNICA and what we're doing, where we're doing it, which is very important, and what we're doing. I think most of you already know that. Then talk a little bit about sustainability that we think we have already today achieved. And then sugarcane, as we think is a superior feedstock. I think the feedstock choice makes a difference on all biofuels.

And then we can talk a little bit about, you know, I think as others have pointed out, Brazil is an interesting case study of making gasoline, now the alternative fuel in Brazil. See what we can do for other places. I like to put this in the context of sustainability of gas prices. I know that's not how it was originally coined, the term, but when you go in to fill up the tank in the United States, people are starting to wonder how high will it go.

First, UNICA, for those who don't know, is the leading sugarcane industry association in Brazil. We have in our membership over 100 mills. We represent about, in terms of production, 60 percent of all the sugarcane ethanol and sugar production in Brazil.

And, as you know, sugar in Brazil, or Brazil's role in the sugar market has historically been quite significant on a global basis. And we hope to do the same for our sugarcane ethanol.

We also have a sort of third product coming online now these days. It's called bioelectricity. It's just basically the electricity from cogeneration of the sugarcane bagasse. And I think we today now represent about 3 percent of Brazil's electricity demand that's coming from the sugarcane. So I will explain one important factoid about that a little bit later.

Now, we've been moving abroad in the sense of policy. I've established an office for

UNICA in Washington where I've been for about 10, 15 years, and before. And we just opened an office in Brussels, as well. And we hope to have on in Asia at some point soon. Maybe we'll go to the state level in maybe the next decade.

What we produce, for those who don't know, that little picture there on your left of the screen is the sugarcane growing. We'll produce about 550 million metric tons of that in Brazil this year.

We bring that into a processing plan and we will make about 26 billion liters of ethanol. About 33 million metric tons of sugar. And another 3000 average megawatts of electricity, although that is increasing quite rapidly as we improve the processing of bagasse which is that little dried up straw thing at the bottom left of your screen.

And obviously our ethanol. The ethanol makes it into cars either as Z100 hydrous ethanol, for those who want to get into the technical terms, or as a blended fuel anhydrous ethanol going into your gasoline.

In the U.S. we see about, you know, going into the E-10 market, as you say. In Brazil there is no pure gasoline at the gas stations.

Everything is at least E25, meaning that we have at least 25 percent ethanol in our gasoline supply.

Where do we produce this. Big controversy, you know, and I love to, you know, sorry for those who have passed geography lesson a long time ago, and I'll force you to go through this again. But just briefly.

Brazil is larger than the continental U.S., so when you look at that picture think something larger than the continental U.S. The rainforest is there on the green area. I'm not here to tell you it has not been significantly deforested, but I'm certainly here to tell you that it's not sugarcane's fault.

I think that basically the key point to understand in terms of sugarcane is that there's sort of three growing areas -- two growing areas in Brazil. One is in the northeast of Brazil, and one in the southeast of Brazil.

The southeast of Brazil represents close to 90 percent of all sugarcane production. That's where all of UNICA's membership is. Traditionally that's where the larger scale plantations or farms are in Brazil.

Again, this is just important to understand. I'm not trying to suggest that what happens in one part of the world, one part of Brazil doesn't have an impact on the other. But let's just get one thing clear. We're not growing sugarcane in the Amazon. I won't say that it's impossible to grow. First, it will grow; anything grows in the Amazon. It looks beautiful and green for awhile. It does not have high sugar content because of the excess water.

I'm also not going to tell you that it will never grow, because as we've seen in the case of soybean in Brazil, many years people used to tell you the soybean will never grow in Brazil and forget it. Brazil can never do soybean. It's really for temperate climates. And then enter GMOs and they manage to get soybean to grow in tropical areas.

Our point is that we think, and part of the reason we're here is that we think this can be done sustainably without encroaching in more sensitive ecosystems. Not that we think that at the same time we can simply put a fence around the Amazon and say nobody's going to go in there.

There's plenty of literature on this,

but remember just one factoid. There's 23 million people living inside that green area that is on the map. What do you tell them, they should just sit on their rear-ends and wait for a check to come in the mail, which will never do.

And so those people somehow have to find a means for a living. And what do we do there? I'm not saying -- I don't want them to grow cane, but they're going to do something.

Moving on. Just a little bit more focused. This is satellite imagery that we pulled together of actual, you know, just zooming in on that southcentral part of Brazil. That's where the cane is being grown this year. And that's pretty much where our membership is.

And as you see -- well, I can't use the pointer, but you'll see, there's some expansion in the western states. Again, you're still pretty far from the Amazon there.

Okay, second thing I want to talk about is really, you know, now that we've kind of at least hopefully set the stage that Brazil's sugarcane industry today, I think, is quite sustainable. Let me make a few points.

First, I was doing this late last night

as I was flying in, so I hope I'll get the comparison with California right. But we use 1 percent of Brazil's arable land to displace 50 percent of Brazil's gasoline consumption.

You will think, well, you know, Brazil's not as big as the U.S., and so forth, in terms of auto market; and that's a fair comparison. I'll always take that.

But just consider this, that if all the sugarcane ethanol we produce in Brazil, if you don't like the 1 percent comparison, think would occupy 8 percent of California. You know, you may think that's a lot, but to displace half of all the gasoline we consume we think it's quite a major feat.

And I can go into details about these numbers more, but what's also important to understand is again the role of soybean and corn. Brazil plants twice the amount of corn in acre terms than sugarcane. And sugarcane we make both ethanol and sugar from. And also we plant three times that amount in terms of soybean.

I don't represent either industry, but I would just point out that when you're trying to figure out where crops are moving, you have to take in consideration these other larger players in there.

In terms of agriculture production in Brazil, basically what you see here is a significant growth of -- probably too hard for you to see from a distance -- but a significant growth in both beef and chicken meat productivity in Brazil. And that's where we've seen significant growth. And that probably explains why you've seen significant quantities of pasture expanding in Brazil, as well as corn and soy protein.

One percent of Brazil's arable land to displace 50 percent of our gasoline consumption. The other interesting statistic that just came out, and this is the updated data, and I'll get into a little bit more detail in a second, is that Brazil's really a leader in renewable energy.

It's historically been because of the large role of hydroelectricity in Brazil. Eighty percent of electricity generated in Brazil comes from hydro. So that would explain that role.

But sugarcane has always been an important player there. And so what we have, just comparing 2006 and 2007 data that came out a couple weeks ago in Brazil shows that now sugarcane is the number one source of renewable energy in Brazil with 16 percent of the total energy consumed in the country. That's electricity, transportation fuels and so forth. Despite the fact, as I said, that hydros have always been a large role.

How have we achieved that. By displacing 50 percent of that gasoline consumption and using the gas to produce electricity. As you may have heard, our mills are all self-sufficient on electricity and steam and power. And what we end up doing is selling a surplus to the grid.

So that 16 percent in climate is where we think we want to be. We like being, you know, in fact, if you look more carefully at this figure and the data from the Brazilian government, it will show you that the only other large player in terms of energy in Brazil ahead of us is fossil fuels. Ask the CEO of Petrobras how he feels about that.

In terms of emissions avoided, again this is comparison against yesterday's gasoline. Like the slides earlier that, you know, looking at the genealogy of cane. Also let's look at the genealogy of fossil fuels.

You know, the fossil fuel of tomorrow is not the same fossil fuel we had. I'll show you some fun pictures here. But basically we feel very confident we can achieve about an 80 percent lifecycle reduction, greenhouse gas reduction, with sugarcane from Brazil. I'll explain a little bit more of that.

Again, you know, I just do this slide, you know, I find it interesting to just point out that, you know, this is one of the first major oil wells in the U.S. that spewed out petroleum. I wish I had a bucket of that right now.

And as you all know in California we've got plenty of oil easily drilled from the U.S. And on the right there is really two, you know, try to do a carbon footprint of that, as I say.

On that right, that's an oil rig off the coast of Brazil that sank. I was actually on it about a month before it sank. And now it sits on the bottom of the ocean. That's, you know, I'm not here to criticize that effort, but it just shows you that things do have an impact. And Petrobras is going to find a lot of oil off the coast of Brazil. But it's in waters probably twice as deep as where that rig was.

And then obviously, as you all have seen pictures of Nigeria and elsewhere, of pipelines getting disrupted and oil pouring out. Not trying to do sensational photos here, but just to make the point that the oil that we will use tomorrow, the gasoline we'll use tomorrow will not come from oil wells or from oil that just spewed out of the ground. But we're going to have to go very far to get it.

The third point I want to make is I want to talk about the sugarcane as an advanced biomass feedstock. We think that we have, you know, I always say on discussions, that our love affair is not with ethanol, it's not necessarily with sugar or anything else, the end products.

Our love affair is with the sugarcane because we do think the feedstock is what makes the difference. And there will be other products we will bring online at some point that have more uses, but hopefully will use the sugarcane.

First, I'd like to try to, you know, I'm first with the disclaimer that I wish some others would have published in the U.S. would have said, I'm not a scientist, so I'm going to try to go into territory here that most of you are probably much more familiar with.

But this picture, which is not the world's best, it's just of a sugarcane, you know, sort of a slice of it, both what's above ground and what's below ground.

And the point I want to make here is that the carbon absorption above ground is significant, as well as there's plenty of absorption under ground.

But more importantly, the root system of the cane remains there for a long time, because we don't replant the cane every year like you do with corn. And not picking on corn, most other crops.

We actually only replant the cane every five, six, seven years. We cut the cane from above ground. In fact, most of the sugar is located, the sugar, itself, is located near the ground level, which is one of the reasons why, for many years, unfortunately, humans have had to cut the cane, not machines. I'll come back to that later.

But in some ways we think the sugarcane is a bit of a carbon-absorbing machine. I'm not trying to suggest that you should cover the world with sugarcane and everything will be well. But let's just bear in mind those figures as I go to the next couple slides.

Two picture of Brazil. One of cane being mechanically harvested in a regular field in Sao Paulo, and then of pasture, let's just put it this was, under utilized. Cattle in Brazil occupies about one head of cattle per hectare. So they've got a lot of land.

The economics basically of cane versus pasture are quite significant. One is mechanized, creates more jobs, you know, and so forth. And the other one is just pretty much you let some cattle range and so forth.

But when we look at the carbon capture, carbon uptake ability of these two crops, something becomes pretty obvious. That the pasture is going to absorb very little carbon over its life. And I've been meaning to ask our scientists if they're including the methane, the other carbons that the cattle are adding to the atmosphere.

But, as well as the -- but at the same time the cane, as I pointed out a couple slides ago, is absorbing significant amounts of carbon from the atmosphere during its growing process.

All I'm saying again is not that we should cover the world or half of Brazil, or even a tenth of Brazil with cane, but simply that when you're making the comparison of where some crop is going to go. And the answer is not always the simplest, as well just let nature take its course. Just reforest the area and presume it will be better.

The reality is there will be carbon uptake from cane immediately upon the first year, as opposed to having to wait for the vegetation to restart.

In Brazil we have about, you know, in the earlier slide I showed about 200 million hectares of available land, pasture and so forth. That's obviously, you know, way too much. It's about five times the size of California, probably, available. We think it's more like 25 million hectares of land available, which is about half of a California, if you think in terms of land mass, I think; a little bit more than half. That is truly degraded pasture that could be absorbing carbon much faster via crops like sugarcane.

Another aspect of why we think sugarcane is such an amazing feedstock is because, you know, we've managed to get significant improvements in the production, in the yields of this crop. Today this is the average in Brazil. We get about 7500 liters per hectare.

In the best scenario that the USDA puts forth, corn gets about 4000. Reality is most of UNICA's mills today, if we look just at the mills that belong to our membership, we're closer to 9000 to 10,000 liters per hectare and going up at probably a rate about 3 or so percent a year. That means we get a lot more fuel out of the same amount of land than other feedstocks do.

And for that reason, and some other reasons, we get a lot more energy out of that crop. You've probably seen this energy balance calculation. And honestly, I think there's nobody comes close, not even cellulosic, in most scenarios is going to be able to reach this nine-to-one ratio that sugarcane achieves.

In large part because you've got sugar inside the plant that you're just converting naturally. And you're using the biomass that remains from the cane to produce the energy necessary to drive the conversion process.

Up till now we've really been using

maybe a third to a half of the cane. Again, just so you understand, because I think all of these things are very important when we make these calculations about lifecycle.

For decades, if not centuries, we've been using the juice of the cane, the liquid that you squeeze out of the cane to make sugar and to make alcohol, ethanol. And some people have molasses coming out of it.

And then over the course of the century we saw that the dried up bagasse, the straw that is -- I'm sorry, the sawdust-looking aspect of it, we could burn it in a simple, you know, boiler and produce steam and electricity. So we used that electricity and the steam to drive the process.

But now because we're mechanizing the harvest, we're actually picking up all that straw, which is really what you see on that picture, the green foliage. And we're going to use that foliage, we're going to --right now we're using it or will begin using it, as we mechanize, we're now 50 percent of the State of Sao Paulo already, which is our membership, is already mechanized in Brazil, we're bringing more biomass to the mill. Which means we're producing more electricity.

And as we retrofit some old boilers we're going to have even more electricity being pumped out of these ethanol mills back into the grid. Right now many of these calculations of lifecycle assessment don't take this into account. And you're also not taking into account that the marginal increase in electricity in Brazil is not coming from hydro. If it is, it's coming from hydros in the middle of the Amazon, by the way. But it will be having to come from fossil fuel.

Most likely the best case scenario is probably natural gas from, you know, five miles under the ocean bed off the coast of Sao Paulo.

So we are, by mechanizing we are bringing in more biomass to the mill that we can just either burn it or, when the technology is available -- I was just at one of these cutting-edge cellulosic technologies last week in the U.S., and we'll be glad to use it for hydrolysis, to put more ethanol in the market. Which will drive lower the price of the product if the technology and the economics make sense.

The third thing I want to make about in terms of why we think it's such a great feedstock is that, you know, despite what some people say, technology can make it much better even. And I'm, you know, I'm a bit of a technology nut.

And I think, you know, one of the easiest things that we have, not easiest but one of the most immediate, things we think we can do is, not just because of the expansion of land, but we will see higher yields from newer technologies. Whether it's hydrolysis, you know, cellulosic basically processes; genetic improvement, all the cane grown in Brazil is conventional right now. Nothing is to say that we may not, at some point, be able to identify a better genetically modified variety of cane.

I think that's a long way for Brazil. Brazil, like Europe, is very sensitive about this issue, but I just point it out as that is another area we could go into to improve yields without needing more land.

As I was talking a little bit earlier, we've been going through this process of reducing the manual harvest. Now, I heard some questions about labor issues. There's nothing better to deal with labor issues than mechanical harvest, except for the fact that transition costs are high.

They're high because each harvester costs about a million dollars, plus all the spare parts and so forth. And every time you put a harvester you've got to layoff about 100 people, 100 workers. So this is a very tough choice.

The industry and the government of Brazil have decided that, listen, we're not going to try to defend an industry, a process that doesn't make sense anymore, so we're going to try to push mechanical harvesting as fast as we can. And our industry is committed to getting rid of all mechanical harvesting of our membership by, I believe, I think the date is 2014, although we are already halfway through there just in a couple years. In fact, we think it will probably be by the beginning of the very early next decade, there will be no more manual harvesting in Brazil.

For those not familiar with the manual harvesting, this is the cane-cutter picture you see often on magazines and so forth. It's an ugly picture, let me just tell you. It's back-breaking work. It is, by the way, the highest paying agricultural job in Brazil today, though.

And as we layoff a lot of people to replace them with machines, there will be a lot of pushback. At the same time, by using the machines we avoid the issues that have caused so many problems to this industry for 500 years.

Remember there were 6 million African slaves that came to Brazil, thanks to the Portuguese and the Spaniards, to grow cane in Brazil to send sugar back to Europe. So this is, you know, we've had a long history, and we see mechanical harvest as a way to end the, you know, close the book on that tarnished history.

But by doing that, also, the important thing in terms of technology is that we bring, as I said, a lot more biomass to the mill. And this is a chart that shows you how much electricity we think we can produce from our mills over the next few years.

In green -- is it in green? It was in all red over there earlier -- in green is if we just continued with the bagasse, using about 75 percent of all the bagasse we capture from the fields, and how much electricity we would produce.

This year we think we're about 2000 to 3000 average megawatts. And then as we go to mechanical harvest, and I would say this is now, this chart's going to get dated in a few months, I think, we're going to be using -- let's say we use 50 percent of the straw, the foliage that we would have previously left, burned in the field. Through mechanical harvesting, brought that into the mill to burn it through in a cogeneration mill. We believe that by 2012, 2013, harvest we could have 10,000 average megawatts of electricity put into the grid of Brazil. This is surplus electricity sold into Brazil from the sugarcane.

Now, for anybody who knows much about the electricity market, that's about what (inaudible) in Brazil does today, or Three Gorges Dam does in China this year. So we think we can, this is as a byproduct, you know. This is truly waste. Otherwise it would just sit on the ground and rot.

And the best part I like to point out, I showed this chart one time and somebody said, boy, this is not good. You're going to show how you guys are making money. And I like to put the headline, it's insurance against subsidies. This is the reason why we don't have any more subsidies in Brazil for the ethanol industry, and the reason why some of these good policies we're pursuing in Brazil will insure that we'll never have to run to the government for help again.

In 2006, 2007, harvest, which is completed, about half of all of our revenues came from production and sale of ethanol. And the other half of production of sugar. We made very little money, or had very little revenues from electricity.

But if the things I was telling you earlier are true, and happen, we believe we'll have about 15 to 16 percent of our revenues from that third product we have today from the sugarcane, which is electricity.

Now, that, my friends, is the best insurance policy against subsidies, because you've just given the mill owner yet another hedge against commodity booms and busts.

By the way, ask this to any corn ethanol, I'm very good friends with many of them, but this is where really they have a hard time. Because they're tied to one commodity coming in and one product going out.

Now, finally, and I'll try not to be too provocative, but is the sustainability of gasoline prices, okay. First, gasoline is now the alternative fuel in Brazil. This is data going to

January, and I just didn't have the chart on my laptop for February and March.

But what you see, total consumption of ethanol in Brazil, both hydrous and anhydrous, now surpasses that of gasoline in Brazil. So, the other day the President of Petrobras was asked by a Wall Street analyst why aren't you raising the price of gasoline. And I'll show you a chart on the pricing in a second. And he said, I can't do that because if I do that I will lose even more market share. Try to do that in the United States for awhile. I mean I live here, and I wish I could say that.

Well, how are we doing this. Actually, thanks to partially a Californian inventor, I'll show you a picture of here, those who haven't quite -- don't remember that history. But we have a growing share of our auto fleet that's flex-fuel. Ninety percent of our new cars today -- that are sold today, are flex-fuel in Brazil. Ford, GM, Toyota, Honda, VW and Fiat. In fact, Fiat's probably the number one today in Brazil.

And basically the only cars that aren't flex-fuel in Brazil are the cars that are actually made to just run on diesel or maybe the Ferraris that some rich guys in Brazil are bringing in.

And by 2011, 2012, we will be about half of the entire auto fleet of Brazil. Again, nothing like California-sized things, but will be flex-fuel cars.

Now, you say, well, what does that really mean, what does that really do. It just shifts the decision of the consumer to choose what kind of fuel he's going to put in his car from the dealership to the gas station. $200 or less change to your automobile. The decision can be moved to the gas station.

This is the picture for those who don't know. Well, the first picture is proving that we were using ethanol in 1925, I believe. This is a trial of an ethanol car in Brazil. If you can read Portuguese and have great eyesight, you'll be able to make the words there.

The other one is a Ford Taurus here in California with the methanol program. It's all pretty much the same technologies.

When the fuel injector comes in, we adapt the technology a little bit more, and that picture right at the bottom is what the consumer in Brazil gets to choose. Green is the hydrous ethanol, the E100 price. And on the other one is gasoline, which is really E25 in Brazil. But the oil companies won't let us tell them that.

And just sort of putting all of it together is the sales of what is really driving our market in Brazil, saw a growth of about 40 percent last year, is the price and the availability of hydrous ethanol, E100, and the availability of flex-fuel engines. It's pretty simple stuff.

And I was asked by Congressman Ed Markey, who was in Brazil a few months ago, he said, you know, you just want to understand, what's the price at the pump for gasoline, and what's the price at the pump for ethanol.

And this is a chart based on A&P, the Brazilian oil and gas agency's data. Nobody will dispute it because it's actual pricing data at the pumps around the country. And the average price of gasoline in Brazil, E25 again, is about 2.5 reais Brazilian currency. And the average price last year, you see a little bit of a curve because we do have a harvest, and in the harvest season the price drops a bit. But it was about 1.5 reais a liter.

And just to show you that we, in Brazil, like the Europeans, love to tax fuels a lot. We tax them both. That bottom line is basically the price of hydrous and anhydrous ethanol at the export market. In other words, it has yet -- it has not been taxed as it leaves the country, because all the state governments have not gotten their hands on it before it gets to the pump.

And then finally, let me just make a couple points in terms of food-versus-fuel. It's really a nonissue for Brazil. As I pointed out and as I can show you in more detail, we're producing more sugar which is the only other, if you want to call that food, from sugarcane every year.

But if you just look in terms of price of oil versus price of food and agricultural commodities, you know, this is a January '95 base. It's pretty clear who's really gone up in the last period. It doesn't mean that on specific commodities, specific crops there isn't a pressure. I think there's absolutely a pressure coming in terms of corn. But there's also, you know, I think currency issues and droughts and so forth play into this.

But what is very clear is that food prices have historically gone up much less than oil prices. And let's remember that the world's land use, this is actually your old mainstay foul, ethanol occupies only 1 percent of total harvested area in Brazil -- in the world. And when we're saying total harvested area, we're not including pastures there. If you include pastures that, you know, could or could not be used for some agriculture production, ethanol becomes even smaller. But then you couldn't see it in that chart and I couldn't make my point.

Finally, I would say is that, you know, some people will try to say that well, this is just unique to Brazil. And I'll grant you that Brazil has some unique characteristics, but I do think that this is worth looking at in many other countries, particularly those in the tropics.

Those are the areas that can produce sugarcane. And we say that probably 100 countries could supply the rest of the world with sugarcane ethanol. Not saying in large quantities, but it's conceivable. While we're today basically held hostage to about 20 countries. And as President Bush likes to point out, not so friendly countries. Or countries that don't like us as much. I've never quite understood what he's trying to say, but I think he's trying not to insult the Canadians.

(Laughter.)

MR. VELASCO: Or the Mexicans.

(Laughter.)

MR. VELASCO: Let me just summarize here, and then we can go into questions. I've got more slides on this if you guys want to ask questions more specific.

We think, you know, in Brazil our sugarcane industry, I'm not going to tell you we're perfect. We've got a long way to go. I've been involved in this industry actually only for about six months or so. I'm in it because I think we can actually make a valuable difference. And we're trying to change the attitude of many in our industry, as well, both at home and abroad.

But we think we're quite sustainable. And we think we can expand it sustainably. Certainly when compared to the fossil fuel option.

And so if you can go away from here remembering that 1 percent of Brazil's arable land displaces 50 percent of Brazil's gasoline, we're now number one renewable source of energy. And, you know, you can dispute whether it's 80, 70, 60 percent, but we think certainly we have a very positive greenhouse gas emission reduction. And the reason is because we've got a superior feedstock.

We do think it's a bit of a carbon-absorbing machine. I don't expect to be selling it, you know, at a 1-800 number, come buy your sugarcane machine and you'll be all set. But we do think the technology can improve our yields and improve different uses.

I mean I won't make propaganda for any California companies, but there are California and other states working on technologies that may use the sugarcane, whether it's the bagasse or the sugar, itself, to produce a wide range of fuels that won't be ethanol. That maybe some of them will be hydrocarbons. And I think that's what we really want to see.

And then just finally, a lot has been said about sustainability. So I took out a bunch of slides on that, in the earlier presentations, the criteria, because I think what is pretty clear is that we've got to have a multi -- I mean we're not willing to concede, like the fossil fuel industry agreed, we're not sustainable. And we'll keep selling it for the rest of our lives.

We're saying we're going to be sustainable. But we want to make sure that whatever definition we come to is a definition we all agree, that we all think is achievable. So that it's not -- becomes simply a mockery of a process.

And so we believe a multi-lateral, multi-stakeholder forum to consider, you know, the sustainability of all feedstocks and processes, including fossil fuels. I think it is fair to do that in a balanced way. I mean it's got to be environmentally adequate. It has to be socially fair.

I mean, like I said, you know, we have to think about the people who are just happening to be living in an area that we all decide that we want to protect now. Well, we've got to pay them some money or give them something to survive on.

And then finally, it's got to be economically feasible, because I do not think, and I'll just end with this example, that if we just keep subsidizing, you know, processes ad nauseam, and just think that that's -- I mean that money could be going to better uses.

One little example is if you didn't see the farm bill, which does a number of horrible things, came up with an innovative idea to address the distortions that the U.S. causes in the sugar market around the world.

We have, you know, a price of raw sugar in the U.S. that's twice the world average because we decided that we really want to keep those sugar barons in Florida and Louisiana and Hawaii in business. Although the Hawaiian guys found out that hotels make more money than agriculture, I think.

And so we said, well, but now after ten years of NAFTA we've got to let in all the sugar from Mexico. Because we told them there would be free trade eventually. And a decade later we've got to show something.

So, they came up with this fascinating idea. We're going to take -- and for the scientists try to do the carbon footprint of this -- we're going to take all the sugar that Mexico and countries with free trade agreements, sell it to the U.S. The U.S. government will buy it all out at U.S. prices, in other words twice the world average price, $400 a metric ton.

And so we'll buy it for about 20 cents a pound. And then we'll turn around and then sell it, the raw sugar, to some ingenious investor who is going to produce ethanol from that raw sugar. Mind you, it doesn't quite work that way. But in order to make it viable for him, we decided we'll probably have to sell it to him for 2 cents a pound.

Now, I first heard this, I said, boy, this is sort of a boondoggle. And then yesterday, and I sent this, the article, to a guy who, you know, sometimes criticizes, Mike Grunwald from Time Magazine, because he's furious about this particular program. And I said, you know, check this out. Because it was an article from, I think, the Houston Chronicle, and a company -- I hope you're not in the room -- you know, telling them how excited they were about this program. Because now they're going to be able to make ethanol from sugar, from raw sugar.

And because, you know, I was just thinking well, who can't. I mean at that price, you know, put dirt in there; it'll probably do something.

But he said they were evaluating the business plan, and as soon as they evaluated it, they would be going to their state and federal government to look for more subsidies. They said we'll need some incentives.

And I said, I mean, you know, at what point, how low do we need to go. And this is the problem. I mean, in any of these sustainabilities, when you're competing with guys with very deep pockets, and on the other hand the only way to compete with these guys with the deep pockets is ultimately to lower the cost of production of a feedstock.

So, guess what? That's why all the production tends to go to the developing world. I mean, I may end in sort of -- you know, I don't want to end in such a pessimistic view, but I think in terms of, you know, just when you think about subsidies, link that to all the environmental issues you're concerned with.

Because you cannot achieve sustainability across the globe if you're distorting markets this much.

Brazil, in many ways, you know, had sort of this luck that in, you know, 30 years ago we decided we were going to kick the habit of oil. It wasn't quite like that, we ran out of foreign exchange so we couldn't buy oil, so we had to make something locally. But it does sound like a good story, I think. And, you know, I'll stick to that one.

(Laughter.)

MR. VELASCO: But the point, I think, for us is that, you know, we made that change. And now we're facing, I think as Prime Minister Gordon Brown pointed out, there may be a third oil crisis. And, you know, maybe the third time is, you know, this is the time to make the change.

We have to do this, I think, in the context of also addressing subsidies and trade distortions. Just simply because it's not that Brazil wants to export all this product abroad. It complicates the economics of any of these commodities.

I will stop there and look forward to lots of questions. If not, I will look forward to a great trip back to Washington.

MR. MANZANILLA: Or lunch.

MR. VELASCO: Or lunch.

(Applause.)

MR. MANZANILLA: Thank you, Joel, thank you very much. We do have time for questions, so if you could approach the mike here to my right, to your left.

I do want to point out that Martina Otto, who is, I think, listed on the program from the United Nations environment program, could not join us at the last minute. And I know that she works very closely with Charlotte Opal in the roundtable on issues related to sustainability criteria and standards.

And Michela Moresse, who would have been the moderator here, who I'm standing in for, pinch-hitting for, could also not make it. And she's from the Global Bioenergy Partnership. And I would encourage you to Google that. It is an effort by the G8 countries, plus five, to really come to grips with many of these issues related to sustainability criteria. In particular they're doing a lot of work on greenhouse gas balances as it relates to bioenergy.

With that, questions from the audience? Don't be shy.

MR. CASSMAN: Hi. Ken Cassman again,

University of Nebraska. And this is for Ariane. Ariane, why did the EU decide or choose to decide not to consider indirect land use change in their directive?

MS. DOMINICIS: Thank you; very interesting question. This is an issue that was discussed when designing the directive. And at the time there was very little work done on the extent of the impact of indirect land usage.

Now, more work has been done, and this is also a question that's being debated in the European Parliament and the European Council. And the Commission is, of course, taking part in this debates.

So I cannot tell you what the outcome will be, but the reason why it's not in the directive is not because we were not aware of the phenomenon and so on, but more because of the lack of scientific data.

And, of course, the idea is to have something that's in line with the scientific evidence and also flexible regarding the new evidence that is given by the academics.

MR. WUEBBEN: Yes, thank you. I'm Paul Wuebben with the South Coast Air Quality

Management District. I want to congratulate our international colleagues, particularly Brazil's threshold milestone of E85, ethanol sales exceeding gasoline. That was quite an achievement.

I noticed your largest ethanol producer, I guess, is buying Esso's or Exxon's gasoline network. That's quite a transition.

I was curious how -- and I appreciated the slide. I believe that was Roberta Nichols you showed in one of the slides, our dear colleague. In thinking about optimization of vehicles, have you had any experience, perhaps, with the Volvo plug-in hybrid, the biofuel ethanol FFVs, or other efforts by manufacturers to take advantage of that two and a half times latent heat vaporization benefit that can perhaps get you to gasoline equivalent parity on the volumetric fuel consumption?

MR. VELASCO: Yeah, thanks for mentioning Roberta Nichols. I never had a chance to meet her, and I should say I met Alex Farrell about two or three times since I've joined this. And he was certainly an inspiration to me. In fact, he was one of the ones, you know, some of the things that we've done in the last few weeks in terms of -- and we will be announcing in the future in a large way have to do with him.

And I look at Roberta as somebody who, you know, I just wish she saw what we were doing in Brazil. I'm sure she understood that.

Basically I think, you know, we've been using ethanol in cars -- we're doing a trial using the Swedish technology to use it in buses in Sao Paulo. You know, this is -- they're using E-95 instead of E-100 in a diesel engine with an additive to help in the combustion.

We obviously -- Embraer, the aircraft manufacturer, and some others have had, piston-firing engines, have been using ethanol. Or at least a blended, basically as an octane booster.

And we will be having -- pretty much every motorcycle or small engine is using this. I make the joke, please, whoever mentioned this, is it's the joke, even the chain saws in the Amazon are running on E-25.

(Laughter.)

MR. VELASCO: It's -- it's not, but it's to point out that it is -- everybody is -- it works and it's a substitute for gasoline. The folks in the renewable fuels industry, the corn ethanol industry, really like that joke a lot more than you guys do.

(Laughter.)

MR. VELASCO: But we see tremendous potential. As I said, we're not tied to ethanol alone. I mean we're tied to the sugarcane. So, if we think we can produce other products from it, whether it's a hydrocarbon-based product out of the sugarcane -- of the sugar molecule that would be fine.

And the other thing I'll point out is there's been a lot of, you know, we tend to get stuck on this first generation, second generation. I never really know where we fit in. Because, you know, you could say we're first generation because it's a pretty conventional process. But all of our results in terms of emissions and so forth, match or beat second-generation fuels. So what is it?

And I think this is one of the cautions in terms of policymaking. Is you try to decide what is what. And you get into very rigid positions.

But back, you know, to your point, I

think we will see continuously new innovations. Anfavea, the auto industry in Brazil, the trade association, believes that they will have parity in terms of mileage per gallon or kilometers per liter between gasoline and ethanol somehow. Don't ask me how exactly they're going to achieve it. Perhaps some of these ideas you're suggesting within the next few years.

MR. WUEBBEN: Are they talking about integrating that with the plug-in hybrid FFV strategy?

MR. VELASCO: Brazil's a poor country. It's, I mean, hybrids have -- it's not going to take off in Brazil because the percentage of -- you're doing small cars and you're focusing on, you know, what we call the low-income population.

The chances of getting them to buy one of those cars, I mean you'll sell some, but, you know, you're probably going to sell more Ferraris than you're going to sell plug-in hybrids in Brazil right now. Because of income, not because people don't believe in it.

MR. WUEBBEN: Thank you very much.

MR. KRICH: You showed a map of the world with all this opportunity for sugarcane ethanol production.

Oh, my name's Ken Krich; I'm with the University of California.

And is Brazil working on that? Are things happening? Are there other countries that are going down this path? Is technology being exported, investment and so on? What is the motive -- is this a spreading trend, or is it just Brazil's getting really good at it?

MR. VELASCO: First, I mean those are countries that are actually growing cane today. I mean we grow cane in the U.S. for sugar only. Because of -- the issue, I think, is first, the subsidy process that, you know, -- we did a -- hold it for a second, hold that.

The other thing, the government of Brazil is pushing this, the government of the United States is pushing this. Not just sugarcane, but other feedstocks. Because we think it's, you know, try to diversify production and reduce dependency on all fossil fuels.

And in that vein the U.S. and Brazil have identified five countries that they want to expand production to. One of them is El Salvador. El Salvador has the problem that I described earlier. They keep prices for sugar from sugarcane extremely high in the domestic market. And that takes away all the economic incentives to produce ethanol, because ethanol is not, you know, doesn't have as high of a price as the subsidized price of sugar.

So, while it makes total sense in terms of tropic area to grow cane in El Salvador, from a business standpoint it won't until such time as the government of El Salvador decides to say, well, we'd rather stop subsidizing sugar production, which by the way they'd then have to import oil because they don't have oil, instead of saying just let the market do it's -- not just let the market, let's structure a process here whereby we're not only producing sugar, but we're also producing ethanol and reducing our fossil fuel imports.

So, that's the case where, you know, it can work, but it hasn't worked because of something else.

We think in Africa, I think there was some discussion of degraded lands, we think that's fantastic. We've actually -- we have some companies that are working in Mozambique and some other countries on that vein.

It's hard, because it's, you know, the initial ramp-up of these mills is a pretty capital intensive process. And then you also have the infrastructure issue because if you're going to try to export it, you know, you have to look at markets.

And right now the U.S. market and the European market are very protected on ethanol. You know, I didn't mention, but I think all of you have read about the tariffs that we face here in terms of importing ethanol to the U.S. at 54 cents a gallon.

So, it's tough, but we're trying.

MR. KLINE: Good morning, and thank you for the great presentations. My name is Keith Kline and I work at Oak Ridge National Lab.

I think that even though you're showing some expansion in the future of sugarcane -- I couldn't read the slide -- maybe 4 million, 5 million hectares over the next 10, 15 years?

MR. VELASCO: Um-hum.

MR. KLINE: Where is that expected to take place, and what provision is UNICA promoting or guidelines to help protect biodiversity and ecosystems? I think the Serrato is especially considered.

And the second question is do you have anything in the works for self-certification for sustainability? Thank you.

MR. VELASCO: I'll take the second question first. In terms of certification, for those who follow UNICA or the Brazilian sugarcane industry, I think we've -- I won't say 180-degree turn, but we've turned significantly. I wasn't involved in the past, and some others, we've basically taken a different position that Brazil has previously had on terms of certification or in terms of sustainability criteria and so forth.

But we've sort of -- we're willing to approach this. We want to encourage our presence here. The fact that we're trying to speak as candidly as possible. The fact that we're -- right now my colleagues are in Brussels doing similar discussion -- is that we embrace the concept.

It's not easy. It's not easy not just because of the technical aspects of trying to define what it is. I think Charlotte tried to point this out, and others have.

But also because, you know, it's that whole how do you tell -- Brazil exports about 10 percent of its ethanol production. So how do we get a whole industry to adapt or at least part of it to adapt to a process that is probably going to be slightly more costly, if not a lot more costly. And how does it make sense for them to go on this way.

I mean it's tough, especially when you're competing. Again, I hate to keep barking on this, but it gets, you know, subsidized production in other countries. But, by the way, in the case of the U.S. many of them are grandfathered in under the Energy Act.

On your previous question where will it grow. Let me be very candid. If we knew exactly where it would grow, we would be able to say, here. We'd put flags all over Brazil and everybody could see and do a carbon soil sample. And we could come in and say, okay, this one should go there, but this one really shouldn't go there.

So, there's sort of two things we need to do. One is to make sure that the incentives, whether it's certifications, structures and so forth, are there to encourage the, let's just say, right behavior. Not that necessarily it's always going to be this black or white.

And then also that we establish, we insure that governments, you know, including the Brazilian government, impose the law of the land. For example, no new sugarcane mill today in Brazil can be started, or even get an environmental license for it, unless it's going to be mechanical harvesting. That's a good thing. That's enforced.

Unfortunately, you know, we all know that the average percentage of the Amazon that gets deforested every year, you know, a good chunk of that shouldn't have been. It's illegal, whatever was done, whether it was illegal logging or cattle ranching, you know, so forth. But the enforcement is lacking.

So that is a real challenge. Now, that's, you know, just giving you the picture and just being candid about it. Where do we see the expansion happening today, and where do we think it will continue.

Degraded pastures. I mean, and low value pastures. Why? Because that, again, in terms of the economics, it makes most sense. And also, but don't -- and this is where it's very important -- don't presume that that pasture, because you occupy it some, you're pushing cattle somewhere else, cattle in Brazil, and the data has showed this, were actually, I use the term confine them. But they're being confined for maybe 1.2 hectares per head to 1 hectare per head. A hectare is 2.5 acres. And that really tightened them up a lot, but that frees up a lot of land. A lot of land.

Brazil has 200 million heads of cattle; there's more cattle than people. So there are gains to be had there without trying to, in other words, to have the balloon effect.

But we also think that the policy has to -- and the enforcement has to be strong to make sure that, you know, that this process is done.

We have seen, and we've been very candid about it, you know, try to get anybody to show you satellite imagery of where their cattle is, we're giving you, telling you exactly what we know, and where it is, and where it's being grown.

We think the incentives are all there. The fact that we're building pipelines for ethanol production from specific areas in Brazil are going to help change the economics of the export market and the production. And all of this will, we think, will encourage better behavior.

But I would, you know, I would not be the first to say that absolutely no cane will ever be grown in the Amazon. Because it actually is. There is one sugarcane mill in the middle of the Amazon and it belongs to an American bottling soda company. I will go that far. And it makes sugar, not ethanol. But it doesn't belong -- I mean it belongs indirectly to the company. But it's there because of a bunch of tax incentives that were done back in the '80s.

And I just point that out to say, you know, it's not -- well, things are a little bit more complicated than they seem. I'll leave it at that.

MR. MANZANILLA: Last question.

MR. SALOUR: Good morning; my name is Dara Salour; I'm with Alternative Energy Systems Consulting. And I had a question for Joel.

Are there any technical issues with regard to burning the straw from the sugarcane production to produce electricity? Or is that pretty standard technology that's been used in the past?

MR. VELASCO: It's pretty standard technology. What is actually changing is when -- most of these mills in Brazil have been off the grid from creation. They were -- I joke about, some of you might have heard me talk about, is this discussion between the mill engineer and the mill owner and the construction guy. And they're trying to figure out, well, how big of a boiler do we need to put on this. And since they only saw their mill, they said whatever amount of energy the mill's going to need.

And that meant that there's -- most of these mills are using very low pressure boilers, producing, you know, electricity not very efficiently from basically burning. And the way they're basically burning is, you know, it's drop in and suspension and catching and flame. If you ever come to Brazil, I'd be glad to show how it works. But, you know, not rocket science at this point. But the boilers were designed basically to just get to self sufficiency.

Because the electricity market in Brazil is changing, in large part because we've been pressuring the government to change it; to incentivize more efficient production of electricity from sugarcane.

All these are also retrofitting to be able, you know, to more high-pressure boilers to be able to take in the bagasse and the straw into an energy cogeneration process.

So, we believe that, you know, that's why when we show that chart, part of what's going on in that huge increase is not just the amount of feedstock going into -- or biomass going into the boiler, but also improving the boiler technology, going from, you know, basically 50-year-old boiler technology to more modern.

Which by the way is another, you know, you want to look at some of the companies that are making lots of money off our industry. Just look at who makes harvesting technology, boiler technology, and you'll see them all singing praises about Brazil's industry because they're seeing the dollars come in.

So, I don't know, I mean basically, you know, I'll try to get you more detail, but we're basically burning at the very same way. It's dried up biomass.

MR. SALOUR: Thank you.

MR. MANZANILLA: Thank you very much. Before we break for lunch we have an announcement.

MS. GILDART: Just to announce about lunch, and that is we had a number of late registrants today. And we were worried about the lunchroom capacity. But there's no problem, we can accommodate everyone for lunch. So please feel free to partake.

The other thing is, -- yes, just to the right as you go out the door -- the other thing is that there are some vegetarian meals available, too, for people who may not have already ordered that. So just let the waiter know.

Thank you very much.

MR. MANZANILLA: With that we'll break for lunch. Please join me in thanking the --

(Applause.)

(Whereupon, at 12:35 p.m., the morning session was adjourned, to reconvene at 1:45 p.m., this same day.)

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AFTERNOON SESSION

2:00 p.m.

MR. SHEARS: Okay, just to get the ball rolling here and start the first of the afternoon sessions. We've got an hour scheduled before the break.

And this afternoon's panel session is going to be looking at domestic issues on sustainability criteria and standards. And we have three speakers. We have Alan Hecht with USEPA Office of Research and Development; Andrew Schwartz with the California Public Utilities Commission; and Michelle Manion with NESCAUM.

And we'll start with Alan at the USEPA. And just to give you an overview of Alan's background -- and should point out, it's Dr. Alan Hecht.

He's the Director for Sustainable Development with the Office of Research and Development at the USEPA. Leads the EPA's efforts to develop the biofuel strategy at the EPA.

He was on detail to The White House during 2001 to 2003 where he was the Associate Director for Sustainable Development, on the President's Council on Environmental Quality. And

Director of International Environmental Affairs for the National Security Council. And Coordinator for 2002 World Summit on Sustainable Development.

From 1989 to 2001 he was Deputy Assistant Administrator for International Activities, and Acting Assistant Administrator for International Activities from 1992 to 1994.

Before joining the EPA he was Director of the National Climate Program at NOAA, the National Oceanic and Atmospheric Administration, from the years 1981 to '89. And Director of the Climate Dynamics Program at the NSF, National Science Foundation, from 1976 to '81.

Dr. Hecht is Adjunct Professor of Government at the College of William and Mary; a faculty member at the Prince of Wales Program, Business and Environmental Program at Cambridge University. And as an External Advisor at the ERB Institute.

And with that I'll introduce Dr. Hecht.

DR. HECHT: Thank you.

(Applause.)

DR. HECHT: Okay. Well, thank you very much. And I want to thank the organizers for assembling a terrific group to discuss biofuels.

About more than a year ago, the EPA began to think about this in great detail. Part of the stimulation for thinking about it, part of the incentive for thinking about it, was the growing number of ethanol plants being built in the midwest.

And our regional administrator, if you know EPA we have ten regions, the regional administrator in the midwest began to raise all sorts of issues about the expanding biofuel production, the number of ethanol plants; there were issues of permitting; there were issues of environment.

So the agency, as a whole, began to develop its thinking. And we started to develop a biofuel strategy, which I hope we will have out to the public within the next month or so, which was really a way of how EPA can begin to organize itself and address the many issues that are going to come out of the expanded biofuel production.

Now, that was, as I say, almost a year ago. We finally got busy about September 2007, and we were moving along. We had a terrific work group that represented the entire agency.

And then in December Congress and the President enacted, passed the Energy Independence and Security Act, which we call EISA. Some people call it EISA, I don't know, it depends on where you are from, I guess.

And if you actually read that, not the all 800 pages, but if you want to do that, you can do that. But there's a section on biofuels. And if you read that, it really enhanced EPA's mandate considerably in some of these areas of the biofuels, besides having to set a new renewable fuel standard, which will be discussed tomorrow by one of my EPA colleagues.

It gave EPA a mission or a mandate to assess the impact of biofuel production, every three years, this report to Congress. And if you read the language very carefully, I don't know if I have it on one of my slides here which I'll go through in a second, it says to assess the current impact and future impact.

And I put a great deal of emphasis on that, because when it says to assess the future impact, it's basically saying really think hard and try and predict the consequences of the rapid expansion of biofuel production, as set by the renewable fuel standard.

And if you know the law, you realize that we're trying to get the 36 billion gallons of alternate fuel by 2022, somewhere around there, with 15 billion gallons being capped coming from corn-based materials.

So, December really changed things around dramatically for us. And since December we have completed this strategy, and we got to get it reviewed internally, and reviewed with our other agencies. And, as I say, we'll soon be able to share it with our external stakeholders so they comment on it, as well.

Now, while this was going on, and I'm introducing my few remarks today by putting this in context, there is an interagency group which was referred to this morning. It was called the Biomass R&D Board. Led by DOE and the USDA. And it provides a mechanism or a form for coordinating research activities and coordinating activities across the federal government.

This Biomass R&D Board has actually been meeting on a monthly basis, so it's been very busy. And it's only within the last I'd say five to six months, certainly with the EISA that was enacted in December; and then in January many of you I met for the first time in Washington during this renewable energy conference, which was called WIREC.

Then we've had the science publications about greenhouse gas impacts on biofuels. And, of course, almost every day more articles appear questioning the challenges of biofuel or biomass material with food security, energy security. So you can imagine the Biomass R&D Board, which is made up of all these agencies, meeting every month, they've got another crisis every month.

But has happened in all this -- and by the way, one of the agencies on the Biomass R&D Board is the Department of State. Not a formal member because it wasn't written into the original legislation, but they've become an active member. And they have brought to the Board the issue of sustainability international certification and questions of criteria for judging the sustainable biofuel production.

So I start my story, my little presentation this afternoon, by the convergence of these three activities. One, the fact that EPA has begun to look seriously internally how it should address biofuels; how it will impact on our existing statutes; and how we can promote sustainable development.

Second, the Biomass R&D Board, made up of all the federal agencies, has now embraced sustainability as the centerpiece of the U.S. environmental strategy, U.S. biofuels strategy.

And third, we are now wrestling with the State Department on what do we mean by sustainable biofuel production. And how do we organize ourselves and deal with this on the international arena.

So that is the background. And now let me just run through a few representations of what we're trying to do. And I want to end up with a work in progress. In fact, much of what I'm saying to you today is very very new in the sense that the interagency groups that are working on this are only now beginning to wrestle with this in the way in which I'm going to lay it out for you.

But there's very important points that I want to emphasize I think will reinforce everything you've heard this morning.

The Energy Act, the EISA, has been the

major driver. It's very clear that in the Energy Act and for all the other activities producing biofuels sustainably, and I'll come to define that in a minute, is quite critical.

One thing that we are looking at, both from EPA point of view and through the federal system, is how do we quantify this. All the discussion this morning, and a lot of it much has really been focused on the major element of greenhouse gas emission reduction, energy, which you can quantify.

But I want to show you a large amount of other issues that we're looking at that have to be, what we think have to be quantified not only for today, but also to look into the future.

The fact is, both in the United States and around the world, there are hundreds of environmental indicators that have been tracked over time. We want to look at all of them. And more importantly, we want to begin to link these indicators to actual policymaking and practices.

We've heard a lot this morning about the international context. And I was very glad to see some of my colleagues from the biofuel community. And it's interesting that if you follow this very closely, maybe in California you're probably more familiar with this, but when I talk to the rest of the country it gets very confusing, because the international community is talking about principles; they're also talking about criteria; and they're also talking about indicators.

So when you sit down and say, well, what does all this mean, what's the differences, you really begin to get into the whole issue leading up to the certification.

Most countries we think are agreed on general principles: do no harm; reduce greenhouse gases; protect your ecosystems. But there's little consensus that I see as yet on actually the measures to do that. That's part of what we're talking about here, and what the U.S. is trying to develop in its own discussions right now.

One of my colleagues who was working the State Department, I think, used this diagram. And I have a feeling he may have stolen it from some of the international arenas, as well. But I like it because it does help us sort out a little bit what we mean by a principle and what we mean by a criteria and what we mean by an indicator. If that doesn't confuse you, I'll throw out the word benchmark, so that you can go home and look them all up and figure out what's really going on here.

Well, here's how we approach the problem. And now I'm talking domestically. Because a lot of the discussion this morning is on the broad international implications. But I just want to give you a framework for how we, EPA, with the other agencies, are beginning to think about this, and sustainably.

When I talk about biofuel and feedback I'm talking about all the different feedstocks. Right now we are in a corn-based feedstock here. That's going to transfer into other things, at least in the United States. Advanced materials, cellulosic materials, and certainly the pressure from the research community and the investment communities to move toward cellulosic materials.

These diagrams, then, if you see the word biomass you can think of all the different feedstocks that are involved. But bear in mind that I'm principally talking about corn-based ethanol in terms of the median impacts.

And when you look at this you can see it's very clearly, it's a simple -- starts off simple, doesn't remain that way. That there are going to be inputs that are going to generate the production of your feedstock; and there are going to be outputs. No big deal.

There are physical factors that are going to determine a lot of what's going on. You've heard this morning about the importance of sugarcane and the value in tropical countries, which may provide a huge economic growth area in the future.

And then there's certain assets that come out of this. Now, by the way, while this is a diagram that I'm going to use in our discussion today, the physical factors of climate not mentioned this morning, but there's a report that just came out from USDA, I think yesterday, -- you can have a chance to look at it when you get back -- on water resources in the United States as a function of climate change.

The western region of the United States is in for serious difficulty. They're already in serious difficulty now, it's going to get worse. Midwestern region, according to these projections, will have a fair amount of precipitation, as will the southeast, but it will vary significantly across the country.

So, as we think about this issue of biofuel production, we're not only just thinking about it today, but we're thinking about how it might be impacted by future climate changes as we move to the future.

So when you start adding all the details now, you can see that your crop production, whether it's stocks or switchgrass or woody biomass, is going to be affected by the physical factors that go in.

The assets that come out, by the way, are your organics and your soil; your wildlife, your water, your ecosystems, your land use. You can see the emissions off to the right. And you can see the inputs off to the left. Which includes practices in chemicals and so on.

And as you begin to see this, something obvious to a group like this is that when you start looking at the lifecycle assessment materials, how complicated it is, but also as I'm leading up to this discussion about indicators, you can see that what are the kinds of things we need to look at.

That if we're going to measure and really say to somebody, well, this is being produced sustainably, it's going to be many of the factors that are contained in this diagram.

So here's where we are. Believe me when I say work in progress. This is really it. We are adopting an approach, or at least starting with an approach that EPA has often used and does use in its report on the environment. If you're not familiar with that document, it was just released, the 2008 version. It was done in 2003, as well.

The 2008 version is a status report on the environment. We call it a report on the environment. It has a model in it that I'm showing you that we're adopting, or at least proposing to adopt, for biofuels, which starts with asking the right kinds of questions. Then defining the criteria that we want to answer those questions. And then coming up with quantitative measures to do that.

Now, I'm not saying the list that I have here, which I happened to draft, myself, so it's nowhere near a consensus, but it does give you a flavor of how the discussion is going in the federal family about the kinds of questions that we're looking at.

So it says, does the production of biofuels reduce the rate of growth of energy consumption and enhance energy security. That's the key question. We want to reduce our dependence on petroleum. We want to do this in a more efficient way.

Do bio-based products and/or co-products enhance economic growth. The colleague from Brazil this morning was talking about -- or someone was talking about products that come out of biofuel production. Co-products could amount economically to 30 percent of the driver for economic force for the use of biofuels in the United States.

So that's a whole other industry that's emerging. And we have to look at that in terms of what that is.

Does the increased production of feedstocks endanger U.S. or global food. Well, the newspapers and the journals, the day doesn't go by without an argument about this. And by the way, one of the key things about this whole area is when you look at the rise of food prices. And there's a healthy debate going on about what's the cause of it.

You really have to look at kind of a time series of what's going on. And I'll suggest to you, as I'll show you on a slide in a moment, the same thing has to be true in looking at biofuels.

Does the production of biofuels reduce greenhouse gases, et cetera. Does the increased production of biofuels endanger ecosystems. Does the increased production of feedstocks result in significant soil, carbon or other nutrient loss.

Now, I think every one of these questions is so common in terms of what the international debate is and what you are all mentioning, it's just that we are starting by listing them. Because with this question the next step is, well, what are the criteria we're going to use to answer that question. And then I'll show you how we get to that.

Do technologies and products protect the environment. Does increased production and use of biofuels result in water pollutants exceeding statutory limits. And, by the way, EPA has the responsibility of not only setting limits, but, of course, enforcing them. And the dilemma that we don't want to face down the road is to have an expanded biofuel sector with all the possible benefits of that result in enhanced emission and/or pollution to the environment, which pushes up against existing statutes, forcing us to have to balance that. That's not what we want. And the way we want to do this is to avoid that problem in the first place.

And finally, does increased production use of biofuels endanger human health through release of chemical, pollutants or air quality. And by the way, not a word this morning was mentioned so far on health effects and/or the enormous challenge, at least I think every country is going to face on biofuels, are the transportation system.

How are you going to move a vast amount of biofuels. And there's a tremendous effort on the way the United States to assess the infrastructure and pipeline distribution nd safety considerations all related to that.

Now, as I said, one of the things that we have developed over many years is the concept of an indicator. It's absolutely crucial that the indicators that we use, not only that we and many others, NGOs and others, are transparent; they're scientifically sound; they're measurable; and everybody can look at them.

So, one of our colleagues who's been involved in the report on the environment has just laid out a number of criteria. And we are using this criteria, at least initially, to define for us at EPA, and then working with all our colleagues, a set of indicators that we think will adequately meet scientific standards. And that can be tracked over time.

And here's the process or the framework. And I say, questions, criteria, just the beginning, because the federal family in Washington is just now beginning to wrestle with this. But let's look at one of those two questions and how we would go about doing it.

Question one, does the production of biofuels reduce the growth of energy and consumption, and enhance energy security. What's your criteria. Choice of technologies and processes throughout the biofuel supply chain. I'll show you a diagram in a minute.

Optimizes energy efficiency; biomass system must reduce the use of petroleum-based products. That's your criteria. We could come up with many criteria, but I'm just saying this is, again, a work in progress.

And what we're aiming for is the criteria for the criteria as the indicators. The amount of energy used in collecting, harvesting biomass. The amount of energy used in converting the biomass. The amount of energy used in transport, et cetera, et cetera, et cetera.

When you go down to number two, on co-products you have another whole set of indicators. And I wouldn't surprise you that when you look at greenhouse gas emissions you obviously are going to have a criteria that says reduce the greenhouse gas emissions. For us in the United States, as you'll hear tomorrow, the indicators are quite clear. Because they're defined in the energy bill in terms of the 20 percent reduction in greenhouse gases for wheat-based or corn-based. And then 50 percent for alternate fuel based and 60 percent reduction in greenhouse gas above a petroleum-base, of, I think, 1990, if that's correct, or 1995. So the statute has defined the set of criteria.

Now, what we're aiming for in the long run for us in the federal family is to answer all those questions or add questions; develop the criteria, and much of these criteria are similar to what you've heard this morning and what is being done internationally. But for us, we're looking for very precise indicators that we can quantitatively define scientifically sound and measure.

Now, let me give you one reason why that's going to be very important in the long run. Here's a model of the fact that you can pick an indicator, let's just say nitrate flow in streams or pesticide use per yield of agriculture, or even agricultural yield, which has been remarkably improved over the last number of years. So that's good.

So you have an indicator, and you have some kind of trend. I use a baseline, or proposing a baseline, it's 2003 with the first energy bill in the United States. The first renewable fuel standard that was issued.

But really, the biofuel production rapidly expanded from 2005, 2006; clearly with the energy bill in 2007 it's going to grow. So if you're out now 2012, you're in a period beyond this 2005, and the period of rapid expansion of biofuels in the United States, or in the world.

So the question is what's the future trend. This is the model you have to think about as you think about this, and we have to, because when we report to Congress in 2010, and we say this is the impact of what's happened over the last three years, since the enactment of this legislation. And they say to us, and what do you project for the future. We'll have lots of models that we can use to project into the future.

But one of the issues is going to be, look at food prices today. The argument over how much biofuel contributes to food prices increase. Well, you have to have the trend. And if this trend continues along the same line, you can argue, well, the biofuels hasn't really affected the trend.

But if the trend goes up, it has, in some way, and you have to then trigger changes in practices and changes in things to get this to really be sustainable. Ideally, you want the trends to go down in certain things and up in others. But having that basic data is what I think is driving us right now.

Here's an example. I mentioned this EPA

report on the environment just published. You can get it on the web. It's -- the cover is shown down there, 2008. It has well over 60 indicators that we use just to track environmental conditions in the United States.

Three of the indicators in this picture I took from -- the fertilizer use in the U.S., 1960 to 2005. And you see the total, which has gone up. You see the level for nitrate, nitrogen, for potash and for phosphate. And I just added the blue circle, the blue square next to it which is the future. Okay.

So now we have an indicator. We can model. We can do what we want. We can think about where this is going as you expand your biofuel production to 36 billion gallons. And you have to recognize that if you're going to be sustainable, and one of your sustainable criteria is that you meet statutory laws, nationally, domestically, whatever, we have to be able to say, we have to be able to track, and we have to be able to change through best practices and other means, any of these trends that are not going in the right direction.

And if there's one underlying message

for us here in this discussion, which we're trying to negotiate -- not negotiate, trying to discuss within the federal family, it's getting the factual data, or getting the science data right so that policymakers can at least have input that's solid that they can use one way or another to make up the necessary policies that go with it.

Now, I want to end, I have just two more slides, by reiterating that for our approach, EPA, but I think this is common now, certainly in all the federal family, and I think it's common internationally now, is you have to look at this whole system.

The British Royal Society did a report a year or so ago -- don't know if there's anyone here from the U.K. -- on sustainability of biofuel production. They made a very important point which we've subsequently adopted in our own strategy about the sustainability of the whole system. The efficiency of the whole system is necessary to achieve the full benefit of alternate fuel use in the world.

So you can start at one end, the feedstock production, and improve your agricultural yield and hopefully reduce your water use. But then it's harvested and collected; it's transported; eventually blended. The whole infrastructure system has to be expanded in the United States significantly.

Ultimately it gets blended and used in the United States. And it's the entire system that is going to determine the sustainability and success of the biofuel industry.

And as you'll hear tomorrow, when my colleague talks about the lifecycle assessment, at least as it relates to greenhouse gas emissions, all of these factors, plus the international factors are taken into account.

In our report to Congress every three years we're going to look at this whole system in terms of lifecycle, not only for greenhouse gases, but for all the necessary elements from water, nutrients and so on down the road.

I'll end with this, because I think all of us are driven by many things in this, energy security. But clearly climate change is one. This projection is from IEA; I find it staggering. Think about the different sectors.

But look at the transportation sector which is, of course, in blue. Not only in the

United States is this going to be an issue, but this new data that was published by the McKinsey Institute just last year projecting 120 million cars over what is now, I may have the number wrong, maybe 10 million cars in China, over the next 20 years.

So, these different sectors, transportation is one in which biofuels can play a big role, but as we, in our strategy at EPA, are looking at this, we are looking at all feedstocks including a heavy emphasis on municipal waste and any other material that can go into helping reduce the carbon emissions of all these things.

In the end the EPA strategy, in the end our national strategy, and in the end the global strategy on energy security must be multifaceted, must include as much energy efficiencies throughout the entire system. Must rely on a variety of different approaches from conservation on down.

And biofuels becomes one element of it. And the degree to which it really really becomes sustainable is the degree to which we can make this system as efficient as possible.

So, that's my story and thank you very

much for including me in your agenda today.

(Applause.)

MR. SHEARS: Thank you, Dr. Hecht. Our next speaker is Andrew Schwartz with the Public Utilities Commission here in California. Andrew joined the Public Utilities Commission in June 2005. He works as the Senior Energy Advisor for the President of the Public Utilities Commission, Michael Peevey.

And he works on a variety of clean energy policy areas including distributed generation, the renewable portfolio standard, and the energy efficiency issues.

Prior to joining the PUC Andrew worked as a data and policy analyst at the Grueneich Resource Advocates, which Andrew describes as a boutique energy consulting firm in San Francisco.

Andrew graduated with a masters degree in public policy from the Golden School of Public Policy at Berkeley in 2004. And he received an undergraduate degree in economics from what's known as CU in Colorado, University of Colorado at Boulder in 1997.

So, with that, Andrew.

(Applause.)

MR. SCHWARTZ: Thanks, I like to say boutique to establish my credentials as an effete liberal. So, frankly, my presentation is a bit of a round peg trying to fit into a square hole here.

To be honest, the PUC is not actively involved in the establishment of lifecycle analyses governing biofuels or sustainability standards. So with that in mind, my remarks are really going to cover less on the issue of biofuels and really more on the issue of sustainability, which I do think the PUC can say a lot about given the various energy policies we have in place.

Really, given the sheer number and size of various initiatives that are under way in the state, I think the best I can hope to do is paint a very broad picture of the various sustainable energy policies that we have in place. I do hope this comes out more as a Matisse than a Jackson Pollack, but we'll see how it goes.

I think California is somewhat unique in how long it's been thinking about sustainable energy policy. Many of the state's progressed energy policies were really born out of various crises that the state has faced and policymakers being awakened, sometimes quite harshly, to the limitations of the status quo.

While that characterization may make it sound as if the state's been very reactive to things, I do think that California deserves quite a bit of credit for the rationality and really endurance of its response to these bents.

And most of these cases, I think, it could be fairly said that California responded not as an anthill would to someone stomping on the anthill and knocking it down with kind of a flurry of panicked action, but ultimately doesn't leave the anthill any less vulnerable.

Instead, we've instituted a series of policies and built on those, I think, provide really a model for both the country, and indeed, in some cases, the world.

The first crisis that I think comes to mind is really the -- or crises would be the oil embargo of the early '70s, which really awakened the nation to the fact that our dependence on foreign fuels was truly problematic.

And in the wake of that crisis the federal government established the Public Utility Regulatory Policies Act, which California implemented very aggressively. The Act obligated the utilities to enter into standardized contracts with so-called qualifying facilities. These were facilities or generators that produce energy using alternative fuels or alternative sources like wind, geothermal, biomass. Or produce energy just more efficiently through the recapture of waste heat, through a process I think everybody here is familiar with called cogeneration.

As I said, California was very aggressive in its implementation of this. And actually as a result of PURPA about 12,000 megawatts of capacity was installed nationwide. Much of that in California.

And in many respects this represents kind of the creation event or big bang of renewable energy development in the United States.

The oil crisis of the '70s also represented the beginning of California's prolonged interest in demand response -- or sorry, demand side solutions. You know, we haven't really focused exclusively on supply side. And, in fact, demand side solutions are really a cornerstone in California's energy policy.

From 1960 to around the mid-70s, per

capita energy consumption in California tracked pretty closely with that of the nation. However, in 1975 California's per capita electricity consumption remained flat while that of the rest of the nation increased by approximately 30 percent to today.

Californians today use about a third less energy on average than our fellow citizens. And importantly, during this period, California did not sacrifice economic growth, and actually grew at a faster pace than the nation, as a whole.

Put this another way, over the past 30 years California has squeezed significantly more value out of every kilowatt hour of electricity used. For example, today Californians get about $5 in value for each kilowatt hour of energy used relative to about $3 per kilowatt hour for the nation, as a whole.

While other factors undoubtedly played a role, much of the credit for this has been attributed to California's commitment to energy efficiency through the effective use of appliance standards, building standards, as well as reforms the incentives that the utilities face, most notably decoupling utility profits from energy sales.

The state has been able to significantly, through these measures, to reduce its energy intensity while greatly expanding the economy.

Had the rest of the country followed our lead over the same period, as a nation we would need approximately 500 fewer power plants and would be emitting about 780 million tons less of CO_2 per year.

Motivation to aggressively pursue demand side solutions was also driven by another far more recent crisis, the electricity crisis. During this event artificial supply shortages coupled with a retail rate freeze and prohibitions on long-term contracting put the incumbent utilities in the untenable position of having to buy electricity in the wholesale market at prices that far exceed what they're allowed to sell it to consumers for in the retail market.

Both PG&E, Pacific Gas and Electric, and SCE, Southern California Edison, were pushed to the brink. And PG&E ultimately declared bankruptcy. The state was forced to step in and procure on the part of the incumbent utilities at extremely high prices. And to this day we're actually still paying off those contracts, and will continue to do so for some time.

Importantly, the electricity crisis was exacerbated by the disconnect between prices that consumers face in the retail market and the price that the utilities face in the wholesale market.

As a general matter, price in the wholesale market changes moment to moment, while, as you know, as a electricity ratepayer the price you see on your bill doesn't change moment to moment. It's sort of based on a tariff that you subscribe under.

Ordinarily, for the utilities this works out okay. And as much as they're assured they'll be able to pass wholesale costs on to consumers through their general ratecases and through sort of the procedural process, however during the electricity crisis, because of the rate freeze, the utilities had no such assurance. So they were literally losing money hand over fist selling energy into the retail market.

Had consumers faced the real costs of their energy purchasing decisions, many would have curtailed their usage significantly, greatly reducing the market power that was used to such disastrous effects by the likes of Enron.

MR. SCHWARTZ: However, without meaningful impact customers must face the costs at approximately the same time that they're occurring in the market. Unfortunately, the ability to convey real time information to consumers is significantly constrained by the existing metering infrastructure.

The sort of legacy meters that are in place right now really tell customers one thing. How much they have consumed. This, coupled with information, the respective utility tariff, allows customers to calculate the aggregate cost of their consumption.

At best, this information gives customers incentive to reduce total consumption. However, not all reductions are created equal. During period of supply shortages, like in the middle of a hot summer day when system capacity is extremely tight, the value of demand reductions are considerably greater than reductions in the middle of the night when the state has plenty of spare generation capacity.

This is true both in economic terms as

well as in environmental terms, as the peaking generation that we rely on, at least here in California, tends to be incredibly inefficient relative to that of baseload generation.

So, to bridge this information gas we have encouraged our investor-owned utilities to replace legacy metering infrastructure with far more advanced, or so-called smart meters. These meters will provide a platform for conveying pricing information that more accurately reflects marketplace conditions. And this technology will provide a means for customers to react to that information through automated load curtailment, by supporting smart appliances and things like programmable thermostats.

The legacy of the oil shocks and energy crisis is really a suite of policies, and to sort of briefly describe, to seek to diversify the resources we rely upon to meet energy needs. This approach recognizes that a monolithic approach to providing energy creates real vulnerabilities both economic and increasingly environmental.

California has a number of efforts to further promote the development of renewables that build on the success of PURPA in stimulating these technologies. These include the renewable portfolio standard program, which requires the utilities to procure 20 percent of their energy from renewable sources by 2010. And the California Solar Initiative, a solar rebate program that has the goal of installing 3000 megawatts of rooftop solar by 2017. And in the process, transforming the distributed solar market into a cost-competitive enterprise.

On the energy efficiency front, our commitment remains stronger than ever, and we're continuing to push energy efficiency as our energy option of first choice. June will be a particularly notable one for the utilities, as they're scheduled to file both their 2009 through 2011 energy efficiency portfolios, as well as their long-term strategic plans.

The energy portfolios represent the specific programs that our utilities offer as a way to achieve the specific energy savings goals that we establish for them.

As a result of a decision earlier this year the utilities now face real penalties and real economic -- positive economic incentives rewards based on the amount of energy efficiency savings they're actually able to achieve.

On the strategic plans also provide a means to develop kind of our vision for a long term energy efficiency approach to delivering energy services. This includes the goal that all new residential construction be zero net energy by 2020, and all new commercial buildings be zero net energy by 2030.

In addition, we anticipate a much greater level of integration across the spectrum of demand side solutions and distributed generation.

In the case of demand response, we are moving forward with ambitious plans to roll out the advanced metering infrastructure that provides the key enabler, meaning full supply side responses to price conditions. And we have the expectation that the investor-owned utilities, PG&E, Southern California Edison and SDG&E will have equipped all of their customers with these advanced meters by 2012.

And one crisis that I have not mentioned is global warming. Unlike the shocks in the electricity crisis, this is not an acute event. Instead we are confronted by what many have, I think rightly, described as the defining challenge of our time.

Maintaining our current way of life within the constraints we now recognize will require an utterly massive shift in the type of technologies we rely on to meet our energy needs.

Fortunately, in many respects, I think the policies that California has in place are well suited to this challenge. All the policies I've described thus far will continue to play a central role in reducing the energy sector's carbon footprint. The specter of global warming and its devastating consequences provides really new urgency to each of these efforts. These policies will also be supplemented by additional approaches to further drive the industry toward cleaner approaches to energy.

In 2006 we established the emissions performance standard which prohibits regulatory utilities from entering into long-term contracts with facilities that have an emissions intensity greater than that of a combined cycle gas turbine. And also to help catalyze the key technological advancements that we required.

We have also initiated a number of

efforts aimed at precommercial technologies. Under the California Solar Initiative, $50 million was set aside to support distributed solar research, development and demonstration projects.

Several weeks ago we established the California Institute for Climate Solutions, a ratepayer-funded research institute that will support applied research in the area of climate change and climate change mitigation.

We also recently approved an application from Southern California Edison to undertake feasibility studies to assess the viability of carbon capture and sequestration.

For each of these initiatives ratepayers are providing what is essentially seed money that will be matched from other sources to leverage that investment.

We are also working within the process headed up by the California Air Resources Board to develop a carbon cap on the electricity sector, which will likely include a cap-and-trade framework. This cap will be part of a broader statewide cap pursuant to Assembly Bill 32, which perhaps you heard about this morning. I missed Mary Nichols' comments, and I'm sure that was key to them.

Over the past year we've issued a number of advisory decisions to ARB, including one on GHG emission baselines and inventories, as well as a decision on the so-called point of regulation, which defines who's ultimately held to account for GHG emissions. And thus, who has to buy carbon permits, or at least hold carbon permits to cover those emissions.

Our next decision will address sort of the most contentious issue, I think, before us, which is namely how to allocate emission permits to the various emitters.

So California really does have a very long history pursuing a sustainable energy policy, and which is a history, I think, that the state takes a lot of pride in.

I hope my remarks have made clear that we're not really resting on our laurels here. There's clearly a lot more that needs to be done. I do believe we're entering a period when we, both as a state and as a country, actually have the will to do what's necessary.

Much of this has to do with the fact that it's increasingly difficult to argue that environmental objectives are not in the financial interests of stakeholders and customers. With oil surging past $120 a barrel, and every indication that carbon will soon have a real price attached to it, it is clear that the progressive energy policies that we've institute in California really represent the way of things to come.

So, I'll close there. I know I really didn't talk very much about the specifics of how California is supporting biomass. I mean I would briefly say that for bioenergy, in general, you know, various policies, in particular the renewable portfolio standard, really recognize this as a resource that has a lot of value. Although, you know, in terms of choosing the particular technologies, we're somewhat agnostic. You know, we use a process by which kind of the best, the quote-unquote, "best" resource, you know, whether in terms of price, reliability, how it fits into the utilities' portfolios wins.

But I look forward to your questions in Q&A. Thank you.

(Applause.)

MR. SHEARS: Thanks, Andrew. As an organization that works frequently at the Public

Utilities Commission on things like the RPS, I'd like to just note that, in fact, the current portfolio, the bulk of the renewables are biomass.

We know people tend to think of solar and wind, and those are technologies our organization very much supports, but right now biomass does represent the largest -- still represents the largest fraction of renewable power production in the state.

So our next speaker, Michelle Manion, who's the Program Manager of the Climate and Energy Team at NESCAUM, the Northeast States for Coordinated Air Use Management, is going to be speaking on activities in other states. I imagine focusing mostly on the northeast states.

Michelle is a Policy Analyst with over 12 years of experience in economic analysis of environmental and natural resource policy, with a focus on energy and climate change policy. In particular, she has extensive experience in issues relating to forest carbon sequestration, and the role of biomass within emerging climate policy.

Previous to NESCAUM she was with the Union of Concerned Scientists working on forest carbon policy, and has also worked as a consultant to a variety of governmental, industry and nonprofit clients including the USEPA, the U.S. Department of the Interior, the World Bank, the World Commission on Dams, and Conservation International.

Michelle holds a master of science degree in natural resources and a masters in public policy and applied economics, and public policy from the University of Michigan. And she also has a BS in economics from Buchnal University.

With that, Michelle.

(Applause.)

MS. MANION: Thanks very much, John, and also thanks to ARB for bringing me out here. It's always a great excuse to come out to California, replenish my vitamin D stores after a winter in New England.

It's great to be here and talking about these issues, because we are working very closely with ARB and with our own states in the northeast on the low carbon fuel standard.

For those of you not familiar with my organization, NESCAUM was founded in the late '60s by the governors to address acid rain problems, realizing that, you know, no individual state could really have leverage over that problem, and we needed to work together as a region.

And so we work with New England, New York and New Jersey on a variety of issues, traditionally air quality, but very much moving more towards climate change and energy. A low carbon fuel standard is something that we're trying to scope out right now for the states.

To give you a little context on our greenhouse gas situation, this is just for New England, but the transfer to New York and New Jersey are really similar. Our business-as-usual emissions are increasing a little over a percent per year, against a very ambitious target set by the New England governors of an 80 percent reduction by 2050. And that translates into about a 20 percent reduction vis-a-vis 1990 by 2020.

And we do have a couple key policies in place, which I'm sure you've heard of. And we have the regional greenhouse gas initiative on power plant emissions for plants larger than 25 megawatts. That's a cap-and-trade program. We anticipate around a 20 percent reduction in baseline emissions for that sector by 2020. So that gets about 20 percent of the way with a certain set of assumptions, of course.

Most of our states have adopted the CA-LEV standards for vehicle emissions and vehicle technologies. So that's roughly another 13 percent or 9 million metric tons.

So we have our work cut out for us over the next ten years. And we're looking at a suite of policies to address the remaining gap. Energy efficiency is a real hallmark of current policymaking in the northeast. We have quite a few states implementing least cost procurement regulations for energy efficiency.

Virtually all of our states now have a renewable portfolio standard. To be honest, we haven't done a lot on VMT reductions. And that's a really big piece of what we need to do in the transport sector, obviously. But we're certainly looking in terms of the fuel component at a low carbon fuel standard for our region, but we have a lot of work to do.

So, what we're looking at in NESCAUM is a couple of key threshold policy questions to provide some recommendations and advice for our states to move forward on a potential regional low carbon fuel program.

And, you know, governors being governors, our governors are the same as any governor anywhere, they're interested in economic development opportunities as well as carbon and climate legislation and policy.

And so we're looking to see what the potential for in-region production in the northeast might be of low carbon fuels, given our biomass resources and our infrastructure.

And, you know, we're very much cognizant that we'll never be the high-volume, low-cost producer. Obviously we just don't have the geography and the physical resources for that. But there's certainly, you know, a long-standing industry in the region that we're looking to transition, as well as a lot of intellectual capital in terms of R&D on cellulosic ethanol and other biofuels.

Certainly, obviously we're all here talking about sustainability. And we're really taking a look at the first five years of a low carbon fuel standard to think about the immediate sustainability concerns.

And really trying to think, too, about

what policies we need to either augment or enhance a low carbon fuel standard to deal with any of those concerns.

So, we're trying to do sort of a five-year snapshot and a 25-year snapshot. Obviously large uncertainty is for the latter time period, but for the five-year snapshot we're looking to come up with estimates for our major feedstock streams in the northeast. Woody biomass, by far and away, is the largest, but we also have a very significant municipal solid waste resource stream, given the real dense population in a lot of densely populated metropolitan areas.

On ag and energy crops we're certainly not going to have as large a component of biomass as other parts of the country, but there's still some potential there.

And just as an aside, we're also doing an assessment of electricity and grid impacts associated with plug-in hybrids and electric vehicles as part of our low carbon fuel study.

So, I'll just take you through really our five-year snapshot. We're still working on the 20-year numbers and 25-year numbers, but we're looking at the entire region here. And I've included Pennsylvania, even though they're not a NESCAUM member, because they do an enormous amount of woody biomass resource.

And what you see here is actually a compilation of woody biomass across quite a few different categories in density terms. We've got numbers for forest residues, secondary mill residues, crop residues, urban wood wastes and net forest growth, or growth over annual harvest at the county level across the region. And your green areas are your denser biomass resources on a per-acre, per-year basis.

And it's sort of a puzzling thing when I first looked at this. I looked at northern Maine and I kind of scratched my head and I thought, I've been there and there are an awful lot of trees up in norther Maine. What we've done here is we've actually netted out existing markets for woody biomass.

The pulp and paper industry in particular has been on a real decline over the last couple of decades in New England, but it's still quite a significant source of user of wood. And so what we see in Maine, and in other parts of New England, is that the incremental biomass that's currently available, above and beyond existing markets. So that's why you'll see some areas that are not as green as others.

And one thing I really need to ask my consultant about is why Suffolk County, which is Boston, is green. There are quite a lot of trees on the Common, but I don't really think on a per-acre basis we're in competition with northern Maine.

But, a key point here is that, first of all, you know, we've netted out wood being used in existing markets. One thing we certainly don't know is how existing markets will compete with demand for feedstocks for biofuels. And so we could be pulling away from the pulp and paper industry from some of the other users of low-grade wood. It's unlikely we'll pull away from the saw mill industry that the really high-grade wood, very valuable, it's probably likely to continue.

And so another point here is that as you see the kind of distribution of where the resources are, there's a lot of implications for infrastructure and transportation when you're trying to pull from the areas that have the greatest resource.

So here's just some initial numbers. And I would point out that these are for a five-year timeframe. They're really quite conservative. What we've done is we've looked at the different categories, and we've taken some estimates. Again, what we think is quite conservative, based on existing regulations that require, you know, areas that can't be harvest, national forests and other state regs.

Existing markets have been taken out. And then we've also just done a somewhat arbitrary sense that we're not going to get all this wood out of the forest. So you'll see in the line for five-year tons captured, the percentages that we've applied to the numbers above.

And what we've then done is translated those into end uses. And an important feature here is that these categories, wood is not all alike. These categories are not fungible. You can't necessarily use -- you wouldn't necessarily want to use forest residues for pellet production. Forest residues have a lot of dirt in them. They're better off going towards electricity combustion.

Likewise, saw mill residues are a little bit higher quality. That's what you're going to be using for pellet production.

So, again, quite a, I think, a pretty conservative estimate, pretty much on the low end. But within five years, in terms of electricity combustion, we could be looking on the order of 400 megawatts.

And, and this is an and, as opposed to an or, because we're using different categories of wood for different end uses, around 400,000 homes switching over from whatever their current fuel is, oil is likely, could be natural gas, using wood pellets for heating.

So, you know, a higher end estimate might be something three, four times this number, depending on what your assumptions are. But I think these are reasonable and probably pretty conservative.

So, just, you know, the issues of sustainability are profound and numerous, but I think one of the things that we're thinking about when we look at the northeast and how the markets are here, I mean there are a lot of conditions simply within the market that are going to also influence how much wood might come to market, and how sustainable that whole lifecycle might be.

I mean right now we've got a very geographic-driven market in the northeast. You pay $10 a ton for delivered wood in Connecticut. That same ton of wood in Maine is going to cost you probably around $60 or $70 in today's market. Just, you know, differences in demand, but also transportation, and a lot of other factors.

The current infrastructure that we have has been built up around obviously the pulp and paper industry around. We have about 20 plants, biomass electricity plants, in the region, as well. So the infrastructure is serving that market.

As we change the market and we build plants in other places, we want to move it to other places, the current infrastructure we have is going to need to change. And it's just unclear how quickly and how easily that might actually happen.

If you wanted to build a plant today in New England or the northeast, you can't get a forward price beyond six months. It's kind of shocking, actually, given how much wood we have and how long we've been using it for a variety of uses. But you can't get a forward price.

And if you're a developer and you're doing due diligence and you're trying to get financing, that's a bit of a challenge, to say the least.

One of the issues here is that unlike the west, by far and away, most of the forests are owned privately. Very little public ownership of a forest. And in New England, in particular, it's dominated by very small forest owners. The average size is under 100 acres in terms of ownership. And so these folks are obviously not owning land with the end goal of support of cellulosic ethanol market, but for a variety of different reasons. You know, wildlife and second homes. And that's really going to influence the amount of wood that comes to market.

So, obviously key environmental concerns that we're all here to talk about on the front end of the lifecycle that Alan was mentioning is really the ecological concerns associated with pulling the wood out, the harvest, and getting the wood to market.

And so we've got, you know, soil quality, nutrient issues, water quality. You know, we want to maintain a relatively higher carbon sequestration rate, habitat diversity, biodiversity.

And then, of course, on the development end you have transportation, you have the production of the fuel, and the use, the transportation. So there's air quality issues, water quality, and your full lifecycle impacts.

Just a couple of quick points. Worked on by folks at UMass in terms of looking at the impacts on calcium retention within the forest ecosystem under different harvest practices, you basically see a doubling of removal of calcium from the forest under a clear-cutting kind of a harvest practice versus a milder, you know, light- to medium-thinning kind of a harvest practice, which is not surprising.

Similarly, if you're looking at streambeds and you're looking a 100 percent clearcut without a buffer, you're going to see significantly higher losses of nitrate and calcium versus a strip cut with a buffer, a more conservative approach.

In terms of water quality impacts, you know, as you're moving a lot of this really heavy harvesting equipment into the forest, and you're packing down the soil, you tend to get much higher rates of water runoff. And that water's running off on that soil that's been packed down. It's also taking a lot of nutrients out of the forest, too.

In terms of carbon sequestration, I mean, you know, a real concern is in most of our states, and there are a few exceptions and I will not point them out, but most of our states have annual growth that is exceeding harvest rates. And so obviously, you know, there's a carbon accumulation there.

And for most of our states, the forestry sector is a sink. And we want to keep that. Obviously we want to even grow that over time and optimize the carbon retention over time, which means we're sort of at that point of the mean annual increment is over the length of the stand, how much carbon you're taking up on a net basis.

And you really want to be hitting at that apex, that's really the optimal point for optimizing carbon sequestration over the full life of the ecosystem.

As you move up to the left, and start

to, for either economic reasons, as your wood becomes more valuable it's more tempting to pull it out of the forest more quickly, but you know, over time that's going to reduce your overall carbon, moving forward, as you've taken more out at an earlier point before the canopy closes.

On the other end of the spectrum we have, I'm really just going to focus on air quality, not to suggest that it's the only concern, but it's particularly for a lot of our states, we do have quite a few nonattainment areas for particulate matter, but we have a lot of areas that are in attainment now, but are right on the cusp.

And so woody biomass is a real concern for a lot of our air regulators. In terms of the applications that we're likely to see, actually that are happening right now, I mean I can't explain to you the phenomena that we're seeing in terms of folks switching from oil to wood. And in some cases, from natural gas to wood, simply because of fuel prices right now in the region.

So, fine particulate, particulate matter 2.5 is a real concern. Air toxics, we've got a lot of mercury deposition in the northeast. And we actually have, you know, it's surprising how much naturally occurring metals are in the soil that get captured in trees. And we're looking at some recent science in terms of mercury, and even arsenic emissions from burning the wood. And NOx emissions can certainly be a concern for larger combustion units.

So this is kind of a striking graphic, but it's PM2.5 emissions scaled by energy use or production for different types of combustion technologies. And as you can see, the small commercial boiler here is really off the charts in terms of PM emissions.

In comparison, if you look immediately to the right there, the Europeans are using much cleaner technologies. And I actually have a colleague who's in Europe right now, in Austria and Switzerland, touring with different manufacturers there. And trying to figure out for the better technologies how he can bring them to the U.S. and have them up to code, because we're obviously in the Stone Age as far as some of these technologies.

But you can see the differences between small commercial boilers. These actually fall under most regulatory thresholds in our region. Generally they're under 5 million Btus. And so for most of our states they're actually not regulated in comparison to natural gas and even oil, we're seeing really high emissions.

So, you know, one of the issues here is that most of the emissions from these units, these smaller commercial boilers that are moving into the region very quickly, about 75 to 95 percent of the PM emissions are the fine particles. And we don't have great combustion control technologies to control these.

And so, you know, this is a market that's under-served; that the few manufacturers of control technologies, because there is no regulatory driver, they haven't really developed those technologies. So that's a clear space in which we need a little bit more of a stronger driver to address some of the issues.

So that's just an example, but I think it's, you know, it's kind of indicative of the challenge of implementing a low carbon fuel standard. You know, low carbon fuel standard, it's a performance standard, and so it's not dictating we're going to have a certain set of fuels and a certain set of technologies. It's saying you innovate and you meet the performance standard.

So, from a policymaker perspective, it's real challenging to kind of -- try to anticipate all of the potential sustainability challenges that could arise from that. Nor should we probably try to guess. Because we want to see innovation, we want to see new things come to pass.

While it does provide a real clear goal in terms of lifecycle greenhouse gas impacts, a low carbon fuel standard is certainly not necessarily a priori protective of these other environmental concerns that we have in terms of water quality, air quality, biodiversity.

And I would suggest that it's probably not the best venue for trying to address all of those issues, but I think, as policymakers, we need to be looking at existing regulations and seeing where we need to augment those or potentially add to those. And to figure out, in terms of enforcement, what we need to do better. And I think we really need to think about incentives, as well.

So I think, you know, we're really looking forward to continuing working with California very closely. Our standard is a little bit different. We're looking to include the market for home heating oil in addition to transportation fuels. But we think there are a lot of analogies and synergies in working with California. We're really looking forward to coming up with a low carbon fuel approach that works and drives the market in the direction we want to go.

That's it. Thank you very much.

(Applause.)

MR. SHEARS: So, we're doing pretty good. We're just a couple of minutes over, but we started a couple of minutes late. And while we're scheduled to start a break at 3:00, we have a window that provides us a little slack when we continue this panel session after the break.

So I just want to provide a few minutes. We will do two or three questions. But we can continue the discussion also later this afternoon, and hopefully all of our panelists will be available to participate in that discussion.

And then before we do the break, I just

have a couple of quick things to say. So, anybody have any questions for the panelists?

So, we have one bidder.

MR. THEROUX: Michael Theroux. This is for Andrew. We have the renewable feed-in tariff that surfaced this year to a lot of different interpretations between the utilities. But in general, a real nice step.

In particular, it allows us to step over that boundary between self generation and merchant plan. And allow us to build out in front of what we need onsite.

And that one aspect, I think, is allowing a completely different consideration of sustainable project development on our campuses and in our municipalities.

Can you speak to how that new tool might provide a little bit better foothold?

MR. SCHWARTZ: Sure, I'll give it my best shot. So, just by way of background, Assembly Bill 1969 obligated the Utilities Commission to establish a feed-in tariff which is what the gentleman was asking about.

The feed-in tariff basically allow or obligates the utilities to procure energy produced from currently really any eligible renewable technology priced at the market price referent, which is currently roughly around 9.0 cents, 9.5 cents per kilowatt hour.

In terms of the ambition here is that there is a resource potential onsite that exceeds what can be used from the onsite load. Those sites would be able to really tap into that, and the revenue stream, via the feed-in tariff, to drive the economics of these kind of projects.

I think one of the issues that we've heard is that the MPR, the market price referent that the feed-in tariff is currently price at may not be sufficient to drive some of the, you know, some of the types of renewable technologies that a lot of people would like to incentivize using this type of approach.

It really was initially kind of aimed more squarely at biogas projects. And so the economics seemed to sort of look more positive there. But for a lot of the other renewable technologies that are out there that the feed-in tariff does support, you know, it's unclear, I think, if the economics are sufficient to get those projects off the ground.

MR. KRICH: Ken Krich, California -- for Energy and Environment. This is for Dr. Hecht.

The main thing about what Dan Kammen said earlier today, it strikes me that when we do these sustainability principles we should be applying them to all energy sources, including fossil fuels. And then we'd get a much better picture. Because the criteria are the same. We could make different rules.

Is there -- I don't suppose there's any federal legislation that allows you to begin to look at that stuff, is there?

DR. HECHT: I think in the energy bill, at least with respect to doing the greenhouse gas lifecycle assessment it is compared to petroleum-based. And I think it's 2005, that's correct. My colleague will talk about that tomorrow. So, in that case that's in the legislation.

I'm not certain that in the rest of the bill in making this comparison that it says explicitly. But I can assure you that in terms of the discussion that goes on within the federal agencies that we're very sensitive to it. Because if you compare how you're doing, it has to be to some base. And I think a base of a petroleum base, in terms of its lifecycle assessment and water use and so on, is something that we definitely want to take into account.

MR. KRICH: Well, what Dan Kammen was showing us is that different fossil fuels have different sustainability criteria.

DR. HECHT: Absolutely. And that's going to change, as he pointed out, over time. So, it becomes even more a factor to take into account as you go to whether it's tar sands or other sources that have different cost/benefit, different environmental outcomes and so on and so forth.

Yes, that's very true.

MR. KRICH: So the basecase might be current petroleum use for gasoline, and then everything else is measured against that? Such as the tar sands?

DR. HECHT: Well, again, I think you have to look at all these cases. I'm not going to make a judgment now, -- have all the data, that say that case A is better than case B.

But I think when you do this lifecycle assessment, or you do the sustainability criteria, it has to be against some baseline. And certainly the trick here is balancing these criteria, trying to reach energy security and, at the same time, protecting environmental resources.

MR. MATTESON: Good afternoon. This is Gary Matteson, Matteson and Associates. This one's for Michelle.

A couple of the states in the New England put in what's called renewable energy credits. And they have prompted or enabled investments in power plant technologies.

I'd like to have you describe both the mandatory and private RECs and how they're influencing that private investment.

MS. MANION: I don't know how much I can really say about the private REC market. I mean certainly the REC market associated with the renewable portfolio standard is by far and away driving most of the investment. And actually it's Massachusetts RPS.

It's kind of an interesting situation because we've kind of competing RPSs with different definitions of biomass across the region. And so, you know, a lot of folks have been trying to find a mechanism to kind of normalize those across the region, because you are getting some disparities.

You can have projects built in states outside Massachusetts that can take advantage of the Mass REC market and the Mass REC market prices are so far away and above those except for everybody but Connecticut, that you're seeing most of the activity driven by the Mass REC market.

And I can't tell you the exact price right now, but that's been probably the most important driver as far as renewable projects in the region.

MS. SHOEMAKER: Hi. Sharon Shoemaker, UC Davis. I have a question for Dr. Hecht. I really enjoyed the panel, your presentation. It's a three-part question.

One, the first part is in terms of the report on the environment. If I heard you correctly, you were saying it's the 2008 report is just out. It's based on 2003 data, or 2005 data?

DR. HECHT: Let me take them one at a time, as I normally take them. The 2008 report is just out, report on the environment. The previous one was 2003. The data that are in the report are extensive and they go back as far as the data are available. So, the 2008 report will simply update data that was from the 2003 report. But the actual trend analysis covers many years.

MS. SHOEMAKER: Great, great. So I misunderstood that. That's super.

And as we know, we hear every day, every week, about biofuels, the plus, the minuses, and all. And it's a very important time. And you gave some very interesting insightful conclusions, decision points, or where we're at regarding the federal agencies' discussions in their groups.

And it would be really instructive to have these available webwise, or communication-wise so that we at the land grant universities or in other venues that we have that we can continually, you know, we can refer to them and do this.

I know that the presentations will be on the website for this particular meeting, but I was going to just ask the question more broadly. Is the output from these federal agencies coming together and asking these questions, coming up with indicators, criteria, definitions and all. Are these getting out to the public-at-large?

And that question also extends to worldwide, because, of course, in the end you want them to move along and to be accepted, and to kind of get to a point where there would be acceptance beyond our borders.

DR. HECHT: This is a very, actually very timely and thoughtful question, because when we had a recent discussion internally, that is within EPA, about web access, someone pointed out that if you do a Google on biofuels at EPA you'll probably not find much of anything.

So, we have certainly recognized that we have an issue in terms of how we assimilate and collect our data and put it out for public comment. You can go to renewable fuel standard and you'll wind up in one of our web locations. But we really don't have a convenient site on biofuels. So it is an issue that we're looking at.

In the federal agencies each agency, particularly the Department of Energy, has quite a few sites, the biomass and the bioenergy. But you're getting DOE material or USDA material.

The material I covered today, which is part of this interagency R&D Board, there's an R&D Board site. But none of this is -- it's sort of new and so in work that it won't be out there, as yet.

In the long run, my vision, as EPA starts to prepare for this report on the environment, is -- I'm sorry, report to Congress, is that public communication is the centerpiece of it. And it's going to be very important. We can't put out a report without expecting transparency and public comment. And it's going to be so influential in terms of business activity or environmental activity that we have to really pay attention to it.

So, we're working on that. But right now it's very difficult if you navigate through EPA to find the kinds of materials that I referred to.

MS. SHOEMAKER: Well, I really encourage it to be worked on, of course. And my last part was just to say that attending recent meetings and all, and with finance and investment type folks, it's as if they're sitting back, in general, and they're being passive about this area.

And it seems like if we could somehow get the investment folks engaged in the public policy discussions, to recognize this as an important part of the integrated system, as we go forward.

DR. HECHT: Well, I will point you in one reference that I think is actually quite useful. EPA has a number of external advisory committees. One is called NACEPT, N-A-C-E-P-T. N-A-C-E-P-T, which stands for National Advisory Council for Policy and Technology.

The have just turned in a report to us based on extensive interviews with venture capitalists on how EPA and venture capitalists can work together.

And just last week we all met together. One of the venture capitalists who I met is actually one who helped launch a bioethanol facility up in Portland. And we're seriously looking at that report in terms of a) how EPA can interact with the venture capital community; b) what they expect from EPA.

It won't be a surprise to you that the number one issue identified in the report was global climate change and its issues. And it's available on the website. You may do a little testing, try EPA, then try NACEPT, and you'll find the latest report there. And it's a very nicely written report on EPA and venture capitalists.

So that may help you.

MS. SHOEMAKER: Thank you.

MR. SHEARS: Thanks, Sharon. Okay, one more.

MS. DUREE: Good afternoon. I'm Tedi Duree from Southern California Edison. My question is for you, Dr. Hecht.

Within the federal government structure and within EPA there are several different categories within the Federal Register that address air or water, land, potential impacts.

And a lot of what we've been discussing is sustainability, that kind of over-arches those areas.

DR. HECHT: Absolutely.

MS. DUREE: We have local government agencies in California that are still segmented. Is there any prospective look at how to integrate all of these different facets? Because arguably they only have their charter to work within. So even though they might like the idea, they can't necessarily give extra latitude.

DR. HECHT: Right. It absolutely is a serious problem, not only in California, but certainly in EPA. We're structured along the lines of air, water, land, chemicals, whatever.

One of the reasons that the administrator and the senior leadership launched us into developing a biofuels strategy was the recognition that we have to integrate across these programs.

And the way we did it is that we had from all our programs, which are media-centric in all the regions, identify the critical issues that they worry about. Then we brought them all together as critical issues. We matched them up against existing authorities.

And then we looked at how they affect each other. And the diagram I have there, the supply chain, was a perfect example of that. You can go through that. In some cases it's an air issue, it's a water issue.

But if you're going to do a report to Congress, or you're going to integrate in any way towards sustainability or can do a lifecycle assessment, you really have to look across the board.

Our strategy tries to look at how EPA can organize itself to best deal with this and be reflective of strategic goals. And we have a long way to go. We have a long way to go.

But I think people are now more sensitive to the recognition of this, not just an air issue, it's not just a water issue, it's not just a chemical issue, but it's the collection of all of that. And we have to find the right management tool and manageable way that's reflective of our statutes, but at the same time allows us to look at it in an integrated way.

MR. SHEARS: So, with that, I'd like to thank the panel. Just because we have to rush out from lunch and we're going to get over here to get started, I'd also like to thank Dr. Axel Friedrich, who he mentioned he was here on his private time. He actually has taken time out of his vacation to come here from Germany to provide us, again, with his refreshing and provocative outlook on issues.

Many of us familiar with Axel always appreciate his perspectives on various issues as they relate to transportation fuels and energy here in California.

Just in case people are wondering, a transcript is being taken of the conference with our old reliable organization, Peters

Transcription Service, over here at the front table. The transcript will be available, along with copies of all of the presentations on the Biomass Collaborative's website, we're anticipating within a couple of weeks.

So just wanted to let people know that you'll be able to access all of the information, including the discussion. And I hope many of you, if not all of you, can be here tomorrow where we'll have hopefully a lot more time. We still have a little time later today to discuss some of these issues. But I think tomorrow we can really start getting into the meat on a lot of these issues.

So, right now I show just shy of 20 after three. And if -- Martha's the gatekeeper. She's saying we're going to squeeze a ten-minute break. So you've got ten minutes to get glucose to feed your grey matter. And we'll see you back here at 3:30.

(Brief recess.)

MS. GILDART: This is session 4. This session is, once again, dealing with sustainability criteria. We've heard quite a bit this morning already on sustainability and what it means to people and what kinds of criteria and programs are being put into place.

Most of the speakers that we've heard so far today have been associated with government, whether it's from the European Union, from the U.S., California, Brazil.

This afternoon in session 4 most of our speakers are associated with nongovernmental organizations. So they will be giving a slightly different perspective on sustainability and sustainability criteria.

Our first speaker is Danielle Fugere who is the Regional Program Director for Friends of the Earth. Her work focuses on climate change, alternative fuels and vessel pollution. She leads the Friends of the Earth climate change litigation to reduce greenhouse gas emissions.

She has participated just recently in California's greenhouse gas vehicle law, defending it in front of the courts. And developing expert testimony and legal analysis regarding alternative fuel compliance methods for automakers.

Danielle has a bachelors degree in political science and a law degree from the University of Berkeley. So, please welcome

Danielle.

(Applause.)

MS. FUGERE: Thank you. So today I'm going to discuss the sustainability, a broad topic, the sustainability objectives of the California NGO community. And I'm going to look at this particularly with regard to transportation, the transportation of fuel frameworks in which we're working, including the low carbon fuel standard.

And one of our primary goals, I guess, and I'll just say it right here, is to bring sustainability considerations into these programs. But that has been difficult.

The importance of sustainability is recognized, but as you're hearing about all of these issues, putting concrete measures into place is not happening very rapidly. So that's one of the main considerations that we would like to achieve.

So, I was going to define sustainability, but I think most people are both familiar with the concept and it's been talked about a lot today. So I won't redefine it to you, but I do want to emphasize its importance, which is looking holistically at products and systems, and measuring their impacts across these traditional regulatory boundaries that we've created, issue areas and even timeframes.

And this is clearly a stretch for our legal and our regulatory frameworks, and to some extent, the quantification and measurement tools that are currently available to us. But we believe it is imperative that we start expanding these traditional concepts of regulation to encompass sustainability measures.

Again, all of you are probably familiar with what's becoming a fairly generally accepted list of sustainability metrics. It varies on the margins, but we're concerned with obviously greenhouse gas emissions on a lifecycle basis, including direct and indirect land use, and various other measures that aren't currently included in many greenhouse gas models, such as water use, nitrogen, et cetera.

Preserving biodiversity. This is an important issue, but it's often difficult to achieve, even in regular arenas, or regulatory processes that are geared toward achieving biodiversity.

And it also strikes me that the move toward more sustainable energy and fuels can, itself, create potential new conflicts. And I think we're seeing that with land use and biofuels. So, we suddenly have a solution that may create more problems than it solves.

Another example is the push in California to use forest materials as biomass. And particularly fuels reduction projects. And so although on the surface this looks like a win/win solution by both creating fuels and reducing risk from fire, from a biodiversity perspective this could be a disaster without a full analysis of the ecosystem issues and the sustainability measures associated with that plan.

So, the others, reducing pollution, most of these others are fairly straightforward. I've added a metric that's not always included in sustainability, which is preventing, or at least regulating, the use of GMOs, nanoparticles and synthetic biology.

In this arena I think that we should, at a minimum, follow the precautionary principle, which would require manufacturers to come forward and demonstrate the proof of safety before products are made relying on these methods.

And the others are fairly straightforward, including social issues, wealth, et cetera.

So the reason that we're here today discussing sustainability policies is that our regular traditional regulatory arenas have proven incapable of preventing environmental degradation on a pretty massive scale.

And in general, those regulatory systems don't even reach many of the social issues that we're concerned about. So that's why we're talking sustainability; and that's what drives us in terms of wanting to bring sustainability measures into regulatory systems that have been unable, really, to deal with that. I think this is demonstrated obviously with climate change, et cetera.

But there is still time to right these problems and the first step is obviously bringing concrete sustainability measures and putting them into place.

In California we're in the midst of such a paradigm change. The state has recognized that our transportation systems must be profoundly transformed to meet our aggressive 2050 greenhouse gas reduction goals; to diversify an economy that's almost 95 percent dependent on petroleum; and to reduce harms and deaths associated with air pollution from vehicles.

Alternative fuel programs, we're working through some of these. So we're working through the low carbon fuel standard. We're looking at AB-118 as an alternative fuel funding mechanism that the state is also dealing with.

But these programs, themselves, are going to create policies that last for decades. And so it's important that we look at sustainability so that we don't exchange one problem for problems that are identified later.

Also, sustainability is important in terms of curbing our tendency to push problems associated with our fuel use outside our borders to other countries. And so that we should be thinking about that. And traditionally our regulatory systems just don't deal with those kinds of impacts.

Also, developing a broadbased sustainability index can be important in making choices between policy options across sectors.

For instance, if we could create a clear sustainability index, the relative benefits, harms and costs associated with increasing efficiency or decreasing vehicle miles traveled could be compared to the benefits, harms and costs of promoting alternative fuels, or new technologies.

So, it's important, sustainability can be useful in the sense of what is the best policy for the state moving forward. And it may be not just looking at it across fuels, but across different alternatives, bringing those sustainability measures into play.

So, how do we apply sustainability principle to our transportation policies. I think given where we're at, these new sustainability metrics and our limited understanding in how to quantify some of these, the process is going to be iterative.

So, we're not going to be able to just jump in today and create sustainability programs for each of these metrics. At the same time, what I don't think we should do is wait until we know everything. Because that's definitely been a tendency in some of these programs, which is to say, hey, this is new stuff; we should wait, we should, you know, the science is still out. Let's not do anything, you know, until a few years down the road.

Well, I don't think we have the time for that, so what the state needs to be clear about is that we're going to -- keeping up with myself -- I think there's kind of a way to structure this in the near term, midterm and long term.

And first, I think most important is the state must clearly define sustainability as a regulatory outcome in each of these programs. And that hasn't necessarily been done. Once that setting it as a regulatory outcome sets expectations. And we believe that saying sustainability matters will drive investment in the right direction.

So, part of setting those objectives is just identifying appropriate sustainability metrics, what is the state going to care about, and what issues will be regulated. That has to be clear from the outset.

Setting meaningful sustainability goals, objectives and standards. We understand, again, that many of these sustainability objectives are likely to be narrative in nature at the outset, but they should be stated. And then the state should begin developing quantifiable criteria as quickly as possible, using existing resources where they exist. And as I talk about later, many resources do exist. And developing others where necessary.

But we urge this specificity because aspirational or directional goals are unlikely to be sufficient incentive to direct investment appropriately.

And although this task, I think, appears daunting to regulatory agencies who are actually just trying to figure out what the structure of, for instance, a low carbon fuel standard would be without sustainability, bringing that in just as a whole other set of hurdles and obstacles.

But, we believe that many standards already exist. They just exist in different areas. So, for instance, measures of soil, health and conservation have been developed in state and federal agricultural arenas.

Many agencies and entities have set biodiversity criteria and preservation standards. And many have mapped where critical biodiversity resources are. So those tools exist and just need to be brought into many of these arenas.

Similarly, international agencies have adopted tools to measure societal impacts. For instance, The World Bank has developed a qualitative adjusted life impact model. And private banks have also established social benchmarks for development projects, one of which is the equator principles.

So some of them are narrative, but they're starting to bring these principles into play in a real way and in terms of development.

It's important that agencies don't back away from sustainability criteria when assessment tools and quantification methods are actually being developed or refined. And I think land use is a good instance of that. There have been a lot of calls to say, let's hold, this is new, we don't understand it well, the science is not developed, we should just not bring sustainability into, for instance, the low carbon fuel standard.

And we appreciate the fact that the state is recognizing the importance of land use and is saying, no, it's not going to be a zero. These are important potentially significant impacts, and we're not going to put a zero in that place while we decide what the science is, while the science is being debated.

So, generally that's the precautionary principle which says that we should take a proactive stance where a reasonable threat of serious harm exists, based on the best available science. Even if absolute and undisputed scientific evidence is not available to assess the exact nature and extent of the risk.

So, we need to step out where there is at least -- where there's debate, but there is good science to say that there is a problem, and that problem could be significant.

And associated with this is developing an expectation that criteria values and methods will be adjusted on a periodic basis, because science is still evolving in this arena, and it will continue to evolve. So the regulated industry needs to understand that there will be periodic adjustments.

And there's a fine line between the certainty needed for investment versus the need to keep up with science in terms of impacts. And so it's a fine line, but I think it's one that can be dealt with.

And one way of dealing with this need to change to update science is to continue -- sorry, is to build protective default values into a regulatory system, such as the low carbon fuel standard. So, again, the land use is a good example.

We should set a conservative number because the problem, as it's currently understood, could be significant, and we could have significant greenhouse gas emissions where we thought there were fewer. So we set a conservative default number which will allow greater long-term certainty for investment, because we know that number is probably not going to be adjusted upward.

While at the same time it incentivizes investment in fuels, but avoids kind of gaming the system. So that's an important way of dealing with some of that uncertainty.

And with regard to setting average and default numbers, that's something that we've also been dealing with. And overall we believe that default numbers should be discouraged to the greatest extent possible in favor of actual tracking and measurements.

It's not always possible, or not necessarily appropriate, but in the -- to the greatest extent we should be using real values to judge sustainability.

A question that's arisen in grappling with sustainability is whether we should deal with impacts that are occurring outside of state boundaries or outside of national boundaries. And our answer to that is obviously yes.

But we acknowledge the difficulty inherent in this. And in terms of our regulatory and legal system, there is much work that needs to be done in terms of allowing those -- bringing those considerations into these regulatory arenas. So we need to continue to work on that.

And then also there's definitely a need to build cooperative bridges between agencies. We've got to overcome this traditional compartmentalization that was just discussed a minute ago, and begin communicating and sharing data, sharing quantification methods and knowledge across the agencies. And even considering cooperative enforcement schemes where necessary.

So, I think EPA is dealing with that. The state should be doing that. We need to have more communication and really holistically look at some of these problems.

And then certification standards. I just wanted to raise the issue of certification standards. We've heard a lot about them today. There are many important and good bodies working to develop sustainability certification programs and standards.

And while important, I don't think those certification programs should replace adoption of state or national sustainability standards. Due to concerns about the voluntary nature of such standards and programs, potential lack of enforceability, definitely -- well, in some cases, lack of public participation, and certainly lack of transparency in many of them.

But these programs are useful and important in informing the development of state or national sustainability standards. And another benefit of these certification programs is creating standards that cross these regional and international boundaries. This is something, again, that individual governments are not the best vehicle for creating, standards that are overarching. So, it's an important role for the certification programs.

And then finally I wanted to quickly address just two models that I think can help sustain, I mean inform our sustainability policies here in California.

And one is we're looking toward the 2007 Energy Security and Independence Act, otherwise known as the renewable fuel standard. And although it has some problems, especially from our perspective in terms of the large fuel mandates and grandfathering, it also is important in setting strong greenhouse gas standards. So I think that's important.

But also, provides a useful starting point in its definition of renewable biomass. Which, through the renewable biomass provisions, it sets screens. And it says biomass extraction or use development can occur in certain areas. In other areas, it can't. Certain areas are prohibited.

So I think that's a good tool to model some of our programs in the low carbon fuel standard, to use that as a base. But it certainly doesn't respond to all of our needs, including that it doesn't reach state protected areas, state forests, international areas. And so all of those, I think, have to be added to that particular structure.

Finally, Senate Bill 1240, which is a bill that's currently making its way through the California Legislature. This, I think, provides another model for implementing sustainability measures.

What it does is in addition to codifying the low carbon fuel standard into law, rather than just leaving it as an executive order, Senate Bill 1240 requires the air quality be maintained or improved; it provides environmental justice protections; it requires that impacts for a broad range of environmental and social issues be avoided or mitigated to the extent possible.

It also requires the Air Board to periodically assess what are the impacts of this program; is it having unintended consequences. And then if there are significant impacts, this bill says you need to adjust the policy, itself, to try to alleviate or reduce those impacts.

So, again, we hope that that bill will pass and can serve as a tool for the Air Board in developing a low carbon fuel standard.

Thank you very much.

(Applause.)

MS. GILDART: Thank you, Danielle. Our next speaker is Nathan Rudgers. He is Director of Business Development for Farm Credit of Western New York, and is a frequent speaker on such topics as renewable energy, food safety and international agricultural policy and economic development.

He is also currently serving on the Steering Committee for 25x25, which is a group of industry leaders that are dedicated to fostering agriculture and forestry's role in securing the U.S. energy independence.

Prior to joining Farm Credit, Nathan also served as Commissioner of Agriculture and Markets for the State of New York from 1999 to 2005. And he's worked for several agricultural businesses in the northeast. He was, indeed, born on a dairy and has a degree in agricultural economics from Cornell University.

So, please welcome Nathan.

(Applause.)

MR. RUDGERS: Contrary to popular misconception, I was not born in the barn. Although I did spend a good bit of time there.

I wanted to spend some time today speaking with you about 25x25, and how we arrived at the conclusion that 25x25 needed to delve into the discussion of sustainability as it attempted to achieve its objectives around renewable energy production.

Back in 2004 a group of us came together, mainly leaders from the agricultural and eventually the forestry industries from across the U.S. to talk about agriculture and forestry's role in the production of renewable energy.

What at first we were led to believe was going to be two- or a three-meeting adventure has led to now a four-plus year odyssey in charting a course for defining how agriculture and forestry can be a part of the renewable energy solution for this country.

And it's resulted in creating a vision and building an energy alliance, constructing and implementing a strategy; and then bringing that strategy to life.

Our vision is that by the year 2025 America's farms, ranches and forests will provide 25 percent of the total energy consumed in the U.S. while continuing to produce safe, abundant, affordable food, feed and fiber.

Now, I'm certainly -- Axel's speech is still ringing in my ears from lunch today. And lest I be compared to the EU Ag Commissioner, will, at the risk of that vision, we feel very strongly that this is an achievable vision, and one that the nation should embrace and take seriously.

We feel like we can meet this goal, of course, by producing transportation fuels, by harnessing wind energy, converting biogas emissions, capturing solar energy and providing biomass for generating heat and power. All activities that take place on the land. So certainly, this is clearly a land use initiative.

Now, getting to 25 by '25 is no small task. In '04, when we started this discussion, we were producing about 5-3/4 quads of renewable energy out of a total of almost 100 quads of consumption in the U.S.

We think that consumption, even with a very aggressive energy efficiency and energy saving protocols will be at about 127 quads by 2025. And that means that we're going to need to achieve almost 32 quads of energy from renewable sources. That's a huge objective to meet.

We've commissioned the University of Tennessee to use econometric modeling to determine whether we could achieve that goal. And they came back with a very positive report that indicated that we could.

We have about 700 endorsers of the 25x25 approach across the U.S. from the environmental, the agricultural and the forestry communities. These are folks who have said yes, we like the concept. We're signing on and we'll stay with you.

And we have operated under a very important principle of "yes, if." Rather than coming together and working around the "no, becauses," we asked folks to consider embracing concepts if certain aspects were met.

And so, "yes, if" allows for people to think very broadly. And allows for them to accept other folks' in the rooms concerns. And acknowledge them and get us to a point where we move forward.

As you'll see, it certainly impacts the depth at which we can drill down on issues, but it has allowed us to put together a very broad coalition of folks who think that ag and forestry are part of the solution when it comes to renewable energy production.

And not surprisingly, folks in the political arena have embraced the concept, as well. And we have this slide shows, I think, 22 governors indorsing, I think we're up to 26 now; 16 state legislatures have endorsed the concept.

And we've got activity going on in many states across the country, including here in California, where there's state alliances who essentially embrace the 25x25 concept, but then apply it to specific state-driven issues, and use it as a framework to promote renewable energy issues within individual states.

Frankly, in many regions of the country it represents the only organizational structure where folks from across the broad spectrum of renewable energy can sit down together and discuss issues and support each other's areas of concern.

As a result of the much-mentioned energy bill of late last year, 25x25 is now a national renewable energy goal. It was passed as part of the Energy Bill and signed into law by President Bush in December of last year.

As we move forward, we identified that our mission now is to document and affirm the fact that we can secure 25 percent of our energy from renewable sources, while producing abundant and affordable food, feed and fiber, while protecting and enhancing the environment, and while strengthening national security and our economy.

I listened with interest to Joel's description of the sugarcane-to-ethanol industry in Brazil; and the incredible success story that that is. And thought about the impacts that that possibly can and will have on the rest of the world. And also about why there are things in place which maybe blunt that impact here in the U.S., namely, as he mentioned at the end of his talk, the tariff on Brazilian ethanol.

Part of that certainly has to do with moving from one area of concern about where our energy comes from and the unstable parts of the world it might be derived from in the form of petroleum, to the next, where if we're not capable of incentivizing our own ability here in the U.S. to produce energy sustainably from the land, then I'm not sure if we've achieved an overall, broadly acceptable policy objective.

So, there's an example of one of the principles that 25x25 is founded on. But an important one, it's this country that has the opportunity to contribute.

We have identified, as well, some very critical challenges and opportunities. Sustaining the resource base, i.e., do we have the land available, and in what shape is that land for producing our renewable energy.

What role agriculture and forestry plays in a reduced carbon economy. As a result of that concern, I've been tapped to chair a working group on greenhouse gases under the 25x25 banner, which for the first time is assembling a broad representation of the agricultural and forestry industries to talk about what their role is going to be, moving forward, in a reduced carbon economy.

And, of course, it's a timely discussion given what's going on in Congress. And some would argue that ag and forestry have been a little bit late to the table, but because we feel like we have a significant, positive impact to contribute, I think there'll be a place for us at that table.

And finally, what contributions

specifically might come from woody biomass. The forestry folks have felt like their voice hasn't been heard as loudly as certain other aspects of folks who work the land in this country. And so, giving them voice through the 25x25 initiative is an important objective, as well.

So we landed on five areas of focus after dealing with about 35 recommendations. Increasing production; delivering energy to markets; expanding renewable energy markets; improving energy efficiency and productivity; and strengthening conservation of natural resources and the environment.

That led us to, in the summer of last year, sit down with a group to come up with our sustainability principles. And believe me, folks, this is no small task, simply because discussions around sustainability have been difficult for folks in the ag and forestry industry to embrace in the past.

And approaching these issues alone, let alone in an open group with folks from different stakeholder groups, environmental groups, et cetera, was a bit threatening for the ag industry.

So, to pull that together and to come

out with a product that folks could agree upon was a challenge. But we think we came up with principles that our 25x25 alliance partners can embrace. And certainly we came out with a suggestion that the 28 member steering committee got fully behind.

Our definition, renewable energy production must conserve, enhance and protect natural resources, and be economically viable, environmentally sound and socially acceptable.

Well, that's broad, but it at least addresses the issue.

We adopted some underlying assumptions. Renewable energy production must comply with federal, state and local laws and regulations. That's a natural.

All regions will have an opportunity to engage. This will not be an approach which excludes any given region of the country. It needs to address multiple values of the land base, the environmental values, our social values of a given geographic region, economic values and certainly the historic values, i.e., identifying that places that have been farmed in the past can have that opportunity in the future. Balance of stakeholder interests must certainly be a central theme.

The areas of focus which we ended up identifying are many. And I will share with you a few of the underlying principles around these areas of focus. For example, in biodiversity, renewable energy production should maintain or enhance landscape biodiversity and protect native, rare, threatened and endangered species and habitat.

Under soil quality and quantity -- and I'll get into this in a little bit more detail as I go forward -- renewable energy production should maintain or enhance soil resources and the capacity of working lands to produce food, feed, fiber and associated environmental services and benefits.

Renewable energy production should incorporate the best available technologies and management practices to protect soils from loss rates greater than can be replenished.

The complete identification of the underlying description of each of these principles is included in the handout which you hopefully had a chance to pick up when you came in today. And, if not, we certainly can provide that to you.

So, from a perspective of erosion on U.S. cropland and some of the progress that's already being made in that regard, as you can see, there's been significant progress both in wind and sheet and rill erosion over that period of time. And a demonstration, frankly, that we feel pretty confident that we can achieve sustainability principles around bioenergy production simply because we've been able to do so effectively around food production in this country.

From a tillage perspective, and this is from CTIC, the Conservation Information Organization, this chart shows percent residue cover management with conventional, reduced and conservation tillage. And, as you can see, we are now over 50 percent conservation tillage in this country on an overall basis, 54.7 percent in 2006.

And so from the perspective of conventional till, which really does not address residue cover management, in a way that some folks would define as a sustainable manner, it's been decreasing from 37.8 percent in 1990 to 23.5 percent in 2006.

Now, why is this happening? It's not

just because producers already recognize the values of sustainability. It's certainly also because technologies have been able to move us in the direction of achieving these objectives in a cost effective, and in the case of $4.50 diesel, a necessity of limiting the amount of tillage we apply to the land, and the opportunity to enhance soil till, soil carbon levels and therefore overall long-term productivity and soil microbial health as a result of embracing these new practices.

These charts are meant simply to demonstrate that agriculture in many many ways already gets it, and recognizes that there are a lot of new opportunities to apply these principles to a new area of production given the opportunity.

So no-till has gone from 7.4 percent of reporting acres in 1990 to 31.5 in 2006. A significant increase in our ability to apply sustainability principles to agricultural production. And one that I believe, again, is readily transferrable to renewable energy production. Especially given the fact that we'll be looking at some crops that enhance our ability to engage in sustainable practices.

Differentiating between fuels on a greenhouse gas basis, this is a chart that you've all seen already, but I think it gives a good demonstration of where we probably will be going. Cellulosic ethanol all the way over on the left at an 81 percent reduction; corn ethanol somewhere in the middle at about 22 percent; and coal-to-liquids with carbon sequestration at a plus 143. I think we understand, as a producing community, where our opportunities are.

I think we understand that we have a role to play. We want to be able to given that opportunity.

I heard in the presentation this morning that perhaps the most sustainable approaches will be those that leave the land undisturbed. And where we derive all of our renewable energy opportunities from waste and from wind and from solar.

We at 25x25, the folks that endorse the 25x25 concept, would argue very strongly that we should be given the opportunity to engage the land resources, as well, from a productive perspective.

And those of you who were paying attention to the sugarcane presentation today will recognize this slide, in that switchgrass has some of the same potentially amazing properties of the capability of sequestering carbon underground, at a huge level. And while also producing a significant amount of renewable energy source on top of the ground.

The challenge is to overcome the recalcitrance of the cellulose and engage the cellulose and hemi-cellulose in the production of carbohydrate fuels. And the opportunity, though, is that we will continue to be engaged in and enhance our ability to be sustainable energy producers.

The feedstocks used to reach 25 by '25, this slide was produced before the most recent concerns about corn-based ethanol. But as you can see, corn ethanol gets to a point -- and also, by the way, produced before the renewable fuels standard came out late last year -- corn ethanol will stay at a level about equal with where it is now. Or it will be, excuse me, in 2012. And by that time, crop residues, waste wood and dedicated energy crops like switchgrass, like hybrid willow and poplar, will become the order of the day.

That's it for me. Thank you very much

for your attentiveness. And appreciate the opportunity.

(Applause.)

MS. GILDART: Thank you, Nathan. Steve Kaffka will be the last speaker of the day before Bryan Jenkins rejoins us for a wrap-up.

Steve Kaffka is Co-Director of the California Biomass Collaborative. And he's an agronomist in the Department of Plant Science at UC Davis, where he works on oil and sugar crops, agricultural water management and salinity management in agriculture.

From 2003 to 2007 he was also Director of the long-term research on agricultural systems project at UC Davis, focused on agricultural sustainability. And he has, in past lives, worked at manure and pasture management and run organic farms in Santa Cruz. And has a doctorate degree in agronomy from Cornell University.

So, please welcome Steve Kaffka.

(Applause.)

DR. KAFFKA: Thank you, Martha. I'm sure we've all been looking forward to this take, it's the last one of the day.

I'm an agriculturalist and I work here

in California and have now for a couple of decades on agricultural issues of various kinds. And I want to be fairly specific in my talk about sustainability, and talk about the kind of -- there's actually quite a rich and long history of discussion about sustainability, strictly from an agricultural perspective. So, I'm going to address that.

But first thing I want to congratulate you all for living really at the peak point in time where that red peak is. We've all been very smart to have been born in the period of time where we've had essentially peak oil. It's meant that we could all travel to conferences like this; visit, you know, Paris; and live with a relatively large amount of comfort and well being.

Prior to this period of oil and coal development, however, humanity and human industry was all biomass based. So in a sense, there's nothing really new about the idea of using biomass, including biomass from agriculture, for various purposes. We just don't know really yet what the future holds with respect to this.

So, I'm going to talk about -- this is a lot of ideas to try to cover, but I think they're important to at least -- I'll have to go over them fairly quickly -- but I think they're important to raise at a meeting like this.

I want to talk about adding the idea of fuel production to agriculture's objectives and what that might mean. What we mean by sustainability, at least with respect to agriculture; the relationship between efficiency and sustainability. I want to provide you some examples of what I think of as improving efficiency from California from my own work. And then possibly address some policy implications.

Let's think fundamentally about agriculture. We expect quite a few different things from our agriculture. We obviously want at least an adequate food supply. We would like to see not only our own diets be increasingly high quality, but we'd like that to be true for the entire world's population. That population's increasing.

We certainly want agriculture to maintain farmers' incomes. We want agriculture to maintain its natural resource base, to use nonrenewable resources prudently, and to maintain and provide habitat for other species.

We want all these things at the same time, but there are tradeoffs among all of them. And we can consider our current agricultural policy as a kind of rough consensus or balance among all of these interests.

Now, some people would regard that balance as unsustainable. Others would say it's doing fine. But, in fact, there's tradeoffs in balances among these issues.

But particularly recently with the price rise of oil we've come to think of agriculture having perhaps another important point. It's quite clear from the petroleum industry, and from others, and from meetings that we've all gone to, that the supply of oil is not necessarily going to be equal to the human needs, considered especially globally.

So, now from previous lists of objectives of agriculture, we've added a new one, which is to provide fuel and biomass for various other purposes, other than for simply food or fiber purposes.

And the addition of that objective influences all the others. And it's going to cause an adjustment in all the others. In fact, we're seeing it right now. We're seeing it in terms of changes in relative prices and availability of things. But we're just at the beginning of that process.

And this is a fairly profound and large undertaking. And it's going to take some time to work through markets and technologies.

One of the reasons that we're engaged in this is because, in fact, the potential energy yield from biomass crops is starting to become close to conventional sources.

The first oil wells drilled in the United States were easy, shallow, high-quality in many cases, easy to get and a lot of energy was produced from those early oil wells. The average in the U.S. industry now, at least according to one source, is much much lower, around the 15-to-1 return on investment of energy. That's quite a difference in wealth generation capacity.

You can compare that to some of the other crop issues like corn ethanol, which is fairly low; the standard number is 1.3-to-1, though I'm sure I know tomorrow we're going to hear about examples of how it can be much higher than, and is, in some cases, higher.

We heard today about Brazilian sugarcane, which is probably the best current example. Biodiesel generally has about a 3-to-1 energy return on investment. And cellulosic sources apparently vary. But most of that is still future technology.

But the fact is that some of these sources are now actually getting to be within the range of possibility of providing wealth to us and useful energy.

And, in fact, at the price of oil currently, which is even higher than $120 a barrel, a lot of these agricultural technologies become cost effective. In effect, what's happened is that because the price of oil is high, we now conversion of crops and crop biomass is economically competitive. And it provides a new base price for the basic commodities that we've had in the past, which in some cases have been lower than the cost of production in the past.

Base prices now, the price of oil and the cost of converting these materials into energy sources. And wouldn't it be nice to be back to $100 barrel oil some day.

But, there's a lot of uncertainty about

what still -- still there's a great deal of this uncertainty about what the best feedstocks will be; what the best conversion or manufacturing technology for those feedstocks will be. Is there a specificity between feedstock and technology.

We're in the process here in this meeting to talk about future public policies governing biofuel production and use. And that has a big effect ont he landscape.

And we really can't entirely predict about the supply and price of oil and natural gas in the future. It's higher than people thought even a year ago. Some people are predicting higher, and some people are predicting -- I heard somebody say it's going to go back to 60 bucks a barrel.

Now, when we talk about sustainability, I think it's extremely important to keep some things in mind. That is that the boundary conditions about which we're talking will affect our determination. As an agronomist, I work at the bottom level there. I tend to work in the field scale, or even at the farm scale, where I can measure changes in soil organic matter, crop trends over time, and things of that sort. That's one way of measuring sustainability.

If I go up to the farm scale, the farm business is concerned about continuity over time and economic value. And certainly it has to maintain its resource base to be able to do that.

But the interests of the farm or the farmer at the farm scale might not be -- or the idea of sustainability might not be the same, it might not correspond to what we would define as sustainable at the social level. So it could be that the interests of farmers aren't necessarily coincident or congruent with the notion of sustainability at a higher level.

So the boundary conditions and the timeframe are extremely important. And I think we have to be careful about that.

In fact, we can think about, at least at the field and farm level, a debate about sustainability as a debate about some kind of balance or compromise between economic pressures that drive intensification, higher rates of through-put per unit, per hour and per acre of labor; and ecological limitations which may provide pressures to limit high rates of through-put. Sustainability isn't a yes or no. It's a matter of more or less in this framework.

This is the most complicated slide I have. And it's a little -- I'm going to take a minute just to walk you through it. Productivity increases to the right and cost increases to the left.

Initially, in low-input systems, in subsistence systems you actually have to put more in than you get back out. So that's one reason that subsistence systems stay in subsistence levels.

But gradually you reach a point of productivity where the rate of productivity increases at a rate much higher than the rate of costs or input rate. And that's where our farmers tend to be.

At some point you reach a point where you have your most efficient rate of productivity or yield relative to cost. Then that starts to change, and you start to have a declining rate of productivity per unit cost, till you reach this marginal point of return. And ultimately you cross back over to the point where it's no longer profitable to increase your input level.

This is kind of the reality of the farm

firm and at the field level. And farmers tend to be somewhere between the red and the -- the red arrow at the top and the yellow arrow. It's very hard, actually, to hit, to find that point of maximum productivity and point of marginal return. So farmers often add a little bit of extra fertilizer, do a little bit of extra from the point of view of insurance.

Any movement back towards even more efficient points on that curve cost the farmers income. So there's this tendency of what satisfies the needs of the farm firm to be different than what might be, from a societal perspective, optimum.

Another thing that's important, and I think if you were to read or review the older literature on agricultural sustainability, which now dates back three or more decades, is that you have to be very clear about the language and the meaning of terms.

So, I'd like to talk about this. This fellow Hansen wrote a paper back in '96 that I recommend to all of you that I think is still useful. And he categorized a large number of papers into four types. Those that advocated sustainability as a philosophy or ideology; those that said sustainability is achievable if you follow a set of strategies; those that define sustainability as the capacity to fulfill a set of goals, which we just heard in the last presentation; and lastly, the simplest definition are those papers that talked about the ability to continue over time.

Remember this about sustainability: it's a property that we want to be confident that in the future that our current systems will have proved to be sustainable. But, of course, in the future we may change our idea about what we mean by sustainability.

So here's a quote about sustainability as a philosophy, where it's talked about as a philosophy or system of farming with roots and a set of values that reflect the state of empowerment and ecological and social reality.

This may be a very kind of noble notion of what living and dwelling on the land should be, but it's primarily philosophical. So if you conform to that notion, then by definition you're sustainable.

What about following a set of

strategies. A good example is organic farming. Organic farming is based in the United States on a set of rules that are now agreed on by USDA. That is a national standard. If you follow those rules and you get a label, some people would therefore say you are therefore sustainable.

Another way is to talk about trying to fulfill a set of goals. This is from the American Society of Agronomy from a few years ago. Sustainable agriculture is one that, again, enhances environmental quality, the resource base on which ag depends; provides for basic human food and fiber needs; is economically viable; and enhances the quality of life for farmers and society, as a whole.

That sounds very good, but what do we mean by any of those things. What is an adequate diet. What do we mean by enhancing the quality of life for farmers. What do we mean about enhances environmental quality. All those are qualitative terms that have to be quantified, that are not essentially very meaningful. And they're not, at a minimum, predictive of the future.

So, really you're talking about does farming -- in all of these definitional terms does farming follow a set of rules or conform to a set of standards, yes or no.

Here's a summary from the Cramer report, a narrative standards from the Netherlands. And these are pretty good. We've been hearing a lot about these kinds of standards all along, about emitting fewer greenhouse gases, not endangering food supply and so on.

I've highlighted number four, production and processing must not reduce soil, air or water quality. As an agronomist I have a bit of a problem with that. Because I can't think of a single farming system that does not, in some way, perturb nature of have some impact on resource quality.

And so it depends on what's actually meant and how you actually quantify or actually interpret these kinds of standards about whether or not they become limiting or valuable.

So Hansen, who wrote this paper I'm talking about, he doesn't like, as a guide for agricultural research at a minimum, definitional terms of sustainability. If all you're doing is fulfilling your definition, then you can't really say anything about how good the definition is.

It's a logical loop. It makes a poor guide for definitions for research; and it may make a poor guide for regulation.

He likes, with respect to research and perhaps we could think about this for regulation, as well, simply sticking to a fairly simple definition for sustainability, which is the ability to continue over time for well-defined systems with clear boundaries, and where, in this case, for research you'd have continuous variables that could be measured so you could compare it's better in variable A, but poorer in variable B.

That it has a tendency to predict what's going to happen in the future. That natural variation is taken into account. And if you're doing research, you want to be able to do diagnosis, why things work or don't work.

So, Montieth had this idea about what efficiency would mean in agriculture, and I think it's actually a pretty good one for the point of view of biofuel production from agriculture.

Clearly, if we want to derive energy from our crop production or crop residue production, we want it to be as efficient as it possibly can. So, an unsustainable system is clearly, or a practice is clearly that kind of practice or system where the amount of input you have to put in the system are increasing while your outputs are decreasing. That's just sinking resources into a hole.

The opposite of that, the gold standard, is where you have increasing outputs for decreasing inputs. It's hard to imagine a system performing at that level over time if its resource base is declining.

Well, actually we've been, with respect to corn production, we've seen increasing yields over time; and the lower figure is a rough index of increasing returns to fertilizer use N, P and K, over time, where yields are increasing at a higher rate than those inputs for corn. And that's one reason why we have corn as the first major biofuel crop in the United States.

Some people, particularly Tillman's group, have suggested, however that low input systems might be better for biomass production. He said -- they argue that in general we'd be better off if we could produce biofuels with low ag inputs, on land with low agricultural value. And that they could be converted into biofuel with little energy. I agree absolutely with the last criteria, but I think the other two actually mis-understand the nature of agriculture.

Because a feature of agriculture, at least modern agriculture, is that we are, in fact, for the most part, seeing increasing returns to total factor productivity. And that comes from the fact that it's not just one technology that's changing, but multiple technologies, better varieties, better fertilizer placement, better seed treatments, better pest management, better control of irrigation. They're all changing, and they're increasing the threshold for response.

So that you might have more inputs on a per-acre basis, but on a per-unit yield basis the inputs decrease. And if we're going to take crops or crop residues for energy, that's basically the system we want.

Now, at the highest production levels, as agronomists, we know better how to manage inputs with greater efficiency than we do under low production systems. And it doesn't mean that such systems are problem-free. Because where you have high productive systems on good land, with high rates of return, you still have inputs, pesticides, fertilizers and others that need to be managed carefully to preserve environmental standards.

And you have a tendency in agriculture for cropping systems to become specialized, too narrow, too many single species monocultures. It's hard, in fact one of the things I work on in California, as an agronomist, is how do we maintain diversity in our cropping production systems.

Now, is this true. Well, in California between 1949 and '91 we saw over a 200 percent increase in productivity with only a 58 percent increase in inputs of all kinds.

You can see it here in the chart, the field crops, which are the ones that primarily have an energy value, they increased about two and a half times over that rate. Now, that rate, on average, has fallen in the last decade, because progress has slowed down to some degree. But progress hasn't slowed down entirely informally or across all sectors.

Now, in California I think the most likely crops for shorter term use are pretty much going to be the same ones that we can use elsewhere. And why am I talking about California. We're mostly a high-value crop area.

Well, I think it's important for California to take care of some of its own needs from within its own borders, and not simply import energy and export its pollution effectively.

So, we probably will see some, and we could see some production of corn. We do have corn and sorghum in the state, wheat and other small grains, a bunch of oil seeds. In the Imperial Valley we may see some sugarcane, sugar beets, and sweet sorghum systems. And in the longer run, cellulosic sources from crop residues like straw and stover and production of perennial grasses might be possible in California.

A number of growers are trying to think about how they can reduce their input costs, particularly around fuel costs, which are phenomenally higher. And now we're up to almost $5 a gallon diesel. Or how they can stabilize its price. So, I think there's a potential to think about some fuel production in the California farms.

The thing that's important, as a principle, to keep in mind that those crops that might be grown for biofuels are part of crop rotation and cropping system. They're not grown -- so we tend to think of them as isolated. Oh, we're going to have a biofuel crop and it's separate somehow from the rest of the agricultural system. It is not. It's an integrated part of the agricultural system.

So let's talk about some examples from the Imperial Valley. This is the place we have the highest solar energy in the world. This is the world's highest sugar beet crop ever achieved about two years ago. I think it might have been surpassed this year by a crop in the San Joaquin Valley, 22.5 tons of sugar per hectare in the July harvest. The average for the season is lower.

But we've seen in the Imperial Valley over the last 12 or so years, a 40 percent increase in sugar beet yields. Which is rather remarkable.

And the work that we've done, because now these yields are so high they're off the charts, our charts. We don't know what our nitrogen recommendation should be. So we've done some work on that. I'm going to go through this fairly quickly.

And the interesting thing is that the recommendation for nitrogen levels is pretty much the same now, at 70 tons or 60 tons per acre of roots in July as they were in 1955. By any measure, this is agronomic progress.

The same is true for water use. These crops are not using much more water than the lower 25-ton-yield crops. If we're going to have both food and fuel, we need this kind of agronomic progress from our agriculture.

I want to give you some other examples. This is a sugar beet field in the Imperial Valley, again. There's some salt-affected areas that slowed growth. The standard crops actually, some of them like sugar beets, which is a salt-tolerant holophytic crop, have a threshold below which the salt doesn't affect them. And then it starts to decline. This is standard for all crops. Though the parameter is there.

We did a field-scale study looking at using GPS and GIS technology. And we found a twofold yield difference between the salt-affected areas and the better areas in the field. If you convert that to simple profit, there's like almost an $800, $900 profit swing between the low and the high ends of the field. And you actually saved money by not -- if you can figure out a way not to farm the area with sugar beets where you're below your profit threshold, you save money. But you also save all the other natural resources. You make your whole system more resource efficient.

You could grow something like Bermuda grass in the area where you have low yield, which is perfectly tolerant to the salinity levels there.

The other technologies that are along and developed and are developing further, drip irrigation, conservation tillage, and biotechnology. And I just put them up there to point out that these are the things that are continuing to influence productivity and efficiency uses in California.

I want to talk about a slightly different way of thinking about this. One of our oil seeds unique to California is safflower. It's a very good oil I recommend you use it. It's much like olive oil. But it's also a neat crop; it's the deepest rooted annual crop that I know of.

And this graph shows you the depletion

of soil moisture at the end of the growing season in two soils in Yolo County. Near here, where Davis is. You can see that almost 100 percent of the soil moisture was depleted to ten feet by the end of the growing season in the better drained soil, and to 14 -- 40 percent of it was depleted to 12 feet. In the Capay soil it's a little less deep soil, and there was a lower depletion rate.

That root system is not just using water it's using nitrates and other things. So, we did a study where we followed cotton in the San Joaquin Valley with a safflower crop. The cotton had been fertilized heavily at different rates. And there was quite a bit of residual nitrate in the field afterwards.

So we grew the safflower without any nitrogen. And it grew quite well, recovering and tapping residual nitrate, as well as the residual water left behind by previous crops. And so if you tried, for instance, to put a greenhouse gas figure on this value, you'd have to account for the fact that this crop is making the whole cropping system function better. As well as, in this case, you can see it's depleting nitrate at depth and protective of the environment.

So it's not simply just a single kind of benefit that comes from these crops and these cropping systems.

I put this up as -- you can't read it, but it represents a range of values of nitrous oxide losses. This is something very difficult to measure. It's an important parameter. In some cases -- but it's attributed to farming and fertilizer use. So in a case with the safflower crop, you get a great benefit from reducing nitrous oxide losses across the cropping system.

So the point I want to make is that if more diverse crop rotations in California you can have beneficial effects from crops like this. In the midwest, where simplified corn/soybean rotations dominate, there's agronomists who suggest that growing perennial grasses in those systems will have a lot of benefits on overall sustainability.

I want to get back now to this policy level, this three-level diagram, and perhaps talk a little bit about the policy, to finish up.

There have been a number of objections recently, particularly in the NGO community, but more broadly, really, even than that, to biofuel production. There's the food-versus-fuel issue. There's land use changes been talked about quite a bit. Agricultural intensification and its consequences. And free trade effects on local economies, or just some of them.

Well, classically you see, when you think of land clearing, to pick one, you think of, well, this is slash-and-burn agriculture which has been practiced in the tropics traditionally for years. And, you know, for thousands of years.

But basically this is the issue. A lot of standing carbon is lost and crop production goes forward. So basically the idea is that if you clear high density carbon systems, you'll never recover the carbon lost to the atmosphere through biofuel use subsequently produced on that land.

But I think there are problems with land use change, especially assessing it in remote areas. It's difficult to quantify and it often involves value judgments. It's unreasonable to ascribe biofuel production alone in many instances because cropping systems have diverse, integrative effects and they'll be site-specific.

The models that have been used so far

were not designed for the purpose for which they're now applied. And you have powerful economic forces and human well being that drive the conversion of land.

Tropical land use changes attributed to biofuel production may not be due to biofuel production at all. Not all conversion is destructive or the least-bad alternative. It doesn't necessarily, the current estimates don't account for new crops, new cropping systems, new technology and their interactions.

And lastly, the last one, I think for California land use change is really not a major issue, because the crops and areas of land that we're talking about aren't too much engaged in export. It's really an internal game.

Let me give you an example. This is land in the San Joaquin -- western San Joaquin Valley that's retired because of a lack both of irrigation water and salinity. There's actually at least a couple hundred thousand acres, and it may be slightly larger.

The reason it's retired is because irrigating -- the San Joaquin Valley is one of the world's great agricultural environments. The majority of the world's almonds are produced there. Wonderful deciduous tree fruits. A whole range of crops from cotton to alfalfa to wheat to you name it.

But there is a salinity problem. And salinity is a natural feature of irrigating that landscape. It's saline waters gradually increasing in the subterranean aquifer. Especially as you get lower in the landscape, towards the right here of the photograph, you can see land that's on one side of that confined layer on the right is not so much a groundwater problem, but on the left there is.

The way that this can be dealt with is through land retirement -- sorry, jumping around here, can't get that right -- wastewater treatment, evap ponds, modification of irrigation drainage, all those practices are there.

But I want to mention one, which is taking some of that saline water and using it for salt-tolerant crops, on retired land. You can see here very low quality land that was abandoned for row crop production in Kings County. What you're seeing there is my deeply loved Bermuda grass. You may find that a contradiction, an oxymoron of some kind, but all of its vices in your yard are virtues here. It's persistent; you can't kill it; it spreads; and it tolerates all kinds of abuse. And it tolerates salinity. It's actually holophyte.

So, we've been, since 1999, able to grow Bermuda grass quite abundantly on this site. And we've been using it to graze cattle. And we have seen actually soil improvement and reclamation occurring. And we've been using marginal quality water on average for the production, wastewater, drainage water, town wastewater.

So, I think that it's possible that on land like this, we could produce biomass. And, in fact, upgrade the system, not degrade the system. And land use change would have a very positive effect. And this is what I know of in California. And I'm sure there are examples of this elsewhere in the world.

So, should we grow biofuels in California. Yes. I think so. But, we need to be very conscious that we are doing it with great efficiency. And for crops, and cellulosic feedstocks, I think wherever possible we should try to do this where we can actually identify multiple environmental objectives or benefits at the same time. Managing the salinity, drainage and selenium problem in the western San Joaquin Valley may be one example where that can occur. It's going to take both theoretical and empirical research to pull that off.

I think, obviously I agree with the principle that we have to think about sustainability from the start. But I want to suggest for those of us in California that we are going to know the most, have the best quality information about sustainability within our own context. There should be some value to that information that can be transferred to growers.

And I don't believe that we should be exporting our pollution. I think we have some responsibility to try to address this within our own state borders, though it is obviously a worldwide circumstance. Right now, we get about a third of our electricity, if I understand it, from coal-fired power plants in Nevada and Utah. So, you know, that means our air quality's better, but the coal is being burned elsewhere.

And the same would be true, to some degree, with biofuels -- that could be true if we're not careful. And in any case, I think we should be engaged in our own processes.

This is a big wide "but" here. I think in this whole process, I was going to say my big wide but, but that wouldn't be true --

(Laughter.)

DR. KAFFKA: I think in this whole process, I think we have to be humble. We have to expect that we're going to make mistakes. Everyone's pointed out how difficult the notion of sustainability is to deal with.

I think it's important that we go slow. That would be in contradiction to some other ideas about how policy should be done. I think we should use a light touch initially, and try not to constrain innovation, and be willing to make prudent tradeoffs. Tradeoffs are unavoidable in life.

I think we should gradually increase sustainability requirements as knowledge and public consensus improves. And I think that we have to be sure that the public agrees that we have legitimacy in our policy. I'm not sure the public understands the implications of these policies with respect to their well being, yet.

At least their economic well being.

So, with that, I'll end. Thank you.

(Applause.)

MS. GILDART: Okay, I'd like to take the time for a couple of questions. I know we're running about 25 minutes late, but I hope that people find these presentations interesting enough that they'd like to ask some questions now.

And then we'll turn it over to Bryan Jenkins for the day's wrap-up.

DR. DALE: My question is for Danielle. Without meaning to be confrontational, I didn't see anywhere in your slides or your presentation whether or not you regard our current dependence on petroleum as sustainable. Is it the position of Friends of the Earth that our current, the status quo is sustainable with petroleum dependence?

MS. FUGERE: Well, I think petroleum should be subject to the same sustainability requirements as all other fuels. There's no reason that it should not be.

DR. DALE: So I guess that's what you mean, then. I agree completely. And I guess what it means is that the comparisons that you will do with biofuels or any other petroleum alternative are never done in the abstract. You're actually making a comparison with the status quo. That's both the important thing to do, and as well as the difficult thing to do. Do you agree that that's what --

MS. FUGERE: If I understand you correctly, yes. I mean I believe that to the extent petroleum extraction is causing social harms, and environmental degradation, we should absolutely be concerned about that and our sustainability processes should deal with that.

DR. DALE: In your mind, then, does sustainability have any national security implications at all? Because that's the fundamental underlying of the EISA Act, is that it's a national security issue and not just an environmental sustainability.

MS. FUGERE: I'm not sure that I said -- I'm not sure where EISA comes in. But,

DR. DALE: Well, it's a national law, it's a national act.

MS. FUGERE: No, but I don't know that I said anything about EISA in terms of changing it. You said it's a, you know, in some respects, a good model. So, --

DR. DALE: I guess I'm just -- see, in my mind there's three primary drivers for considering biofuels. It has to do with national security issues, climate security issues and also the potential for rural and regional economic development.

And I think it's a mistake, I think it would be a bad thing for the environmental community to get so totally committed to one view of environmental improvements that we forget those other two important legs, the social, which I appreciate your reference to, but also the national security issues.

MS. FUGERE: Right, all these are tradeoffs, and I think what I see in terms of sustainability is looking at all those tradeoffs and knowing what those tradeoffs are. And then making policy decisions based on that knowledge base.

And so to the extent that we don't know, and we're acting rashly and without understanding of what impacts may occur because of our choices, I think it's a problem.

So I would very much like to say, well,

these are the sustainability implications of petroleum, biofuels, electricity generation, and make those choices in a reasonable manner with full information.

DR. DALE: Okay, thank you. I didn't hear much about tradeoffs in your presentation, so I appreciate that's part of your thinking. Thank you.

MS. FUGERE: Thank you.

MS. GILDART: Are there any other questions? All right, well, let's thank our panel and we'll move to the wrap-up.

(Applause.)

DR. JENKINS: All right. So I leave for three hours to go teach a math transfer lab and I come back here and I find you still sitting here talking about sustainability.

I was hoping that you would already have the report written, that we would already be on our way, and I wouldn't have to address you here again about what we need to do.

However, what I heard this morning, excellent presentations; and what I just heard the latter part of this afternoon, excellent presentation. Some interesting discussion there towards the end. I guess perhaps we'll continue that tomorrow.

I do want to point out I did leave you with a charge this morning, which was to listen and contribute. I anticipate -- expectations are bad -- I anticipate that you will continue in this charge tomorrow. And I will leave you with some more homework.

Which is to think about what are the questions and what are the comments and how you really want to see the state act towards the development of sustainability standards in the future, in the near future, as well as in the longer term.

And be prepared to discuss these tomorrow and on Friday. But particularly tomorrow, because we will continue with a set of presentations. Tomorrow we're going to talk about lifecycle analysis and sustainability implications. We're going to talk about how we measure all these things, what value there is in that measurement. And methodologies, and, of course, the implications of what we measure.

And the techniques are, of course, extremely important. What values we come up with will, of course, dictate what we actually do. We can talk in principle, but we're going to have to come down to standards that people can actually follow.

And so towards the end of tomorrow, if you look at your program you'll notice that there is a session there, more of an open session, it's a panel discussion, moderated panel discussion. And it's an opportunity for you to address panelists tomorrow, but actually all of the panelists that we'll hear over the coming time. And present your opinions. Hopefully we'll get enough time to do all this, of course, but present your opinions and ask your questions. And bring these before the panel so that we can get your ideas included in the proceedings of this forum, and so that we can begin to incorporate those into the development of the sustainability standards.

All right, so that's your homework assignment. Don't forget to do it. All right. It will be graded tomorrow. No, no grades.

But in any case, we have an excellent program lined up for tomorrow. I hope you will attend. And another excellent program lined up for Friday. So I appreciate you being here. I've learned a great deal just in the time I've been able to spend here. I hope you've all been able to spend much more time than I was able to spend today.

And so I look forward to seeing you all again tomorrow, and I don't want to hold you up any further. So, be safe, have a good evening, and we'll see you tomorrow. Thanks very much.

(Applause.)

(Whereupon, at 5:03 p.m., the first session of the California Biomass Collaborative Joint Forum was adjourned, to reconvene at 8:30 a.m., Thursday, May 29, 2006, at this same location.)

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CERTIFICATE OF REPORTER

I, PETER PETTY, an Electronic Reporter, do hereby certify that I am a disinterested person herein; that I recorded the foregoing California Biomass Collaborative Fourth 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 17th day of June, 2008.