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CALIFORNIA BIOMASS COLLABORATIVE

BIOENERGY INTERAGENCY WORKING GROUP

INFORMATIONAL MEETING

ROADMAP FOR BIOMASS DEVELOPMENT IN CALIFORNIA

CALIFORNIA ENERGY COMMISSION

HEARING ROOM A

1516 NINTH STREET

SACRAMENTO, CALIFORNIA

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9:05 a.m.

Reported by:
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I N D E X

P R O C E E D I N G S

9:05 a.m.

MS. BROWN: My name is Susan Brown; I'm a Senior Policy Analyst here at the Energy Commission. And today I'm going to wear two hats. I'm the newest member of the California Biomass Collaborative Board of Directors. In fact, yesterday was my first business meeting of the Collaborative. I'm also the Lead Staff for the state's bioenergy interagency working group, which means that I have a direct interest in the proceedings today, and your input on the preliminary roadmap we're here to discuss.

So, I thank you all for coming. I'd like to give some brief remarks by way of background. First of all, the bioenergy working group was actually formed by Governor Schwarzenegger and reinvigorated in August of 2005. And our group, which is composed of nine separate state agencies, was asked to develop a bioenergy action plan which was actually released by Governor Schwarzenegger in July of this year at a very public event in Madera, California.

The roadmap that we're here to discuss I view as a complementary activity. In fact, the

Collaborative has long served as a technical advisor to the bioenergy working group, and will continue to perform that function as we implement the Governor's executive order on biomass.

I thought it would be helpful, however, to explain in more detail the relationship of the roadmap that we're here to discuss today, and the bioenergy action plan.

The roadmap and the plan actually differ in -- they have some similarities in that they're both intended to promote the sustainable use of bioenergy in California, but some very distinct differences. They differ in scope. They differ in the timeframe that's involved. They differ in the level of participation by those that have formulated the plan and the roadmap. And they differ in many other aspects, as well.

The bioenergy action plan commissioned by the Governor is actually a near-term, state action plan which involves only state government. By contrast, the roadmap is a more visionary conceptual document which extends out farther to 2050. And also involves not only just state government, but government at all levels, the private sector, academia, and nongovernmental

organizations.

So they're really very different documents but I view them as complementary. So, your input on the roadmap will actually help us in moving ahead. It will help us in not only implementing the Governor's production targets that were established in his executive order, but also to advise the bioenergy working group on how we can move beyond the 2010, the 2020 timeframe to a vision of a sustainable bioenergy future.

So that's just by way of introduction. I think it's important to keep these two parallel, but complementary, activities in mind.

So, with that I want to again thank you all for being here today. I want to next introduce Valentino Tiangco who's going to make a brief presentation on behalf of our research program here. And as many of you know, the roadmap that we're reviewing today was funded in large part by the Energy Commission through its Public Interest Energy Research.

So, Val.

DR. TIANGCO: Thank you, Susan. Good morning. On behalf of the PIER renewables program, energy generation research office,

California Energy Commission, I would like to welcome you all at this informational meeting.

Susan mentioned the purpose of this meeting is to solicit your comments on this roadmap for sustainable development of biomass in California.

This roadmap supports key state policy goals. It supports RPS, renewable portfolio standards, goals; the Integrated Energy Policy Report; energy action plans; and the Governor's response to the Integrated Energy Policy Report.

In April 2006 Governor Schwarzenegger issued executive order SO606 proclaiming the benefits and potentials of bioenergy in helping to meet the future needs of the state for clean renewable power, fuels and hydrogen; and calling for actions by the state to meet targets for biofuel and biopower development.

By 2010 we should be producing 20 percent of the biofuels, increasing to 40 percent by 2020, and 75 percent by 2050. And meeting a 20 percent target within established state goals for renewable electricity generation for both 2010 and 2020 timeframes.

Subsequently the state's bioenergy

action plan, as Susan mentioned, tasked the California Energy Commission, through the California Biomass Collaborative, to prepare a roadmap for biomass research and development.

This meeting is -- the main purpose, as I said, is to solicit your comments on this draft roadmap. This roadmap also supports the Governor's greenhouse targets. It also supports the AB-1007 mandate; the state plans to increase the use of alternative transportation fuels. This slide shows the process, the scope and timeline of this AB-1007.

By June 30 we need to have the -- should be completing the plan. And then the Commission intends to have the plan completed actually by January 2007.

This roadmap also supports the Public Interest Energy Research program vision. The PIER vision statement is to have a sustainable energy choices for California. We have a mandate. And our mandate and our process is open to inform and responds to state policy. It provides environmental stewardship and natural resource conservation. It provides leadership to develop affordable, innovative and useful solutions. And

it involves stakeholders, also. We encourage stakeholders' collaboration in this process.

The PIER energy policy is always carried out within the context of California energy policy and addresses needs not met by private sector. PIER R&D aims to provide advanced technology and improves the lives of Californians, which means that PIER must interact with the marketplace.

PIER R&D planning, management and evaluation is designed and carried out with the intent of meeting policy goals or revising policy goals. Engaging with users and manufacturers throughout the R&D process. And PIER R&D addresses critical technical market and policy risks.

This is the vision for the California Biomass roadmapping exercise. And you will hear more about this. I will not dwell so much on this one, but the vision is to have a sustainable biomass resources energize a healthy and prosperous California through the environmentally beneficial production and use of renewable energy, biofuels and bioproducts.

Just a capsule of what you're going to hear for today, this roadmap achieving the vision,

as you see on the right side of this slide. And the five goals that we have and the mandates, the 2010, 2020, 2050 mandates that we have through the Governor executive order and the renewable portfolio standards.

Similarly, the priority areas which you may hear all of them today, from the Collaborative Staff, five priority areas, and the sustainable biomass vision that we have on the right-hand side.

That's all that I would like to say. And I welcome you all. And this is an open meeting. There will be public comment at the end.

As a way of logistics for in today's meeting I need to say this, just a few housekeeping items before we begin. For those of you not familiar with this building, the closest restroom, as you know, is in that side. And there is a snack bar on the second floor under the white awning.

Lastly, in the event of an emergency and the building is evacuated, please follow our employees to the appropriate exits. We will reconvene at Roosevelt Park located diagonally across the street from this building. Please

proceed calmly and quickly, again following the employees with whom you are meeting to safely exit the building.

Thank you.

MS. BROWN: Thank you, Val. And before I turn the mike back to Bryan I want to also add that we are transcribing the meeting today mainly for our own use. And so if you do make public comment, please step up to the podium and identify yourself, name and affiliation for the record. And I think the court reporter would really appreciate that.

So I think that about wraps up our preliminaries. And, Bryan, I think it's back to you.

DR. JENKINS: Thanks, Susan, and good morning. It's good to see so many friends here; some new friends, too. So I want to thank you for coming. This is an informational meeting on the roadmap for biomass development in California.

(Pause.)

DR. JENKINS: Okay, a couple of other announcements in regard to follow up what Susan was talking about. There are some blue cards on the table in the lobby to this hearing room. If

you wish to make a spoken comment today, please fill out one of those blue cards and get it to Pete Dempster, who's sitting over there on the side. We would like to get your comments today, of course.

Also there are some sign-in sheets out on the table; if you have not signed in, please do so. We'd like to have a record of who's here and we'd like to be able to get back to you, if you make comment, even if you're just making a brief comment from the floor.

So let me begin then with a brief introduction to where we stand with the roadmap, and then what we're really looking for here today, because we would like to get whatever comments you have. We're interested in taking the document that's been developed so far. This is going out now for public comment. And we're interested to see what we might have missed, where we've -- what are the things that we should consider in the roadmap, maybe items that you have various interest in or comment on that are already in the roadmap, as well.

So, with that, let me proceed here. Of course, the roadmap is a guidance document. We

use roadmaps for various purposes. In this case we have -- we are where we are in the State of California with respect to biomass. We have a vision which has been articulated here by Val in his introductory comments about where we might want to be.

This is the vision that the process has come up with so far. You may have a different vision about where biomass should be in the future. And, of course, we have different paths to get there, different roads to take. The question is will we be able to get to where we want to be, which is the sustainable use of biomass -- the management and use of biomass in the future.

Just a review of the resource base with you. Many of you have seen this before, but these are our estimates of the biomass that's currently available in California. And, of course, we can change this in the future as we begin to change our agricultural practices and management practices; begin to look at dedicated biomass crop production in the state in more detail.

But basically we have three main sectors that are producing biomass currently: agriculture,

forestry and, of course, our urban activities with municipal solid waste and other residues from what we do.

And if you look at the total amount of biomass we think is produced annually, it's about 80 million tons. These are dry tons. We think that somewhere in the order of 30 million dry tons are sustainably available for industrial use essentially. And if you look at the energy content of that, think about the bioenergy applications, this is basically a half a quad of energy, about 500 trillion Btus per year of energy contained in that biomass. The question then is how do we use this biomass.

And, of course, we're not going to produce just energy from this biomass; we'll also be producing various products from this material.

If we took all of that biomass and used it in particular applications, for example, if we were to take all that biomass and produce electricity, this would constitute a total capacity in the state of about 4600 megawatts under current efficiencies.

Associated with that, if we were to use it, would be an amount of heat and roughly 9000

megawatt thermal of heat. And if we simply took all this biomass and made heat out of it, then we'd have something around 11,000 or 12,000 megawatt thermal of heat, or about 350 trillion Btus in heat.

For biofuels, biochemical conversion of biofuels would result in about somewhere around 2.3 billion gallons per year capacity. If we went to thermochemical processing for biofuel production, we might be somewhat less than that, but in terms of total energy content in those fuels we might be higher because we're producing different types of fuels. Instead of ethanol through biochemical processing, for example, we might be producing diesel fuels through thermochemical Fischer Tropsch and other processes. We can also make ethanol from biothermal chemical processes.

If we look at biomethane production and thinking about the materials that are suitable for that, might be looking at somewhere around 100 billion cubic feet per year in capacity in those materials. And, of course, we could also make hydrogen, both by thermal means as well as biological and biophotolytic means to produce

hydrogen. And the capacity there might be somewhere over 2 million tons a year of hydrogen.

We're not going to take all of the biomass and use it in any one sector like this. We are going to do multiple processes, or use multiple processes to produce this.

So if we look at potential development scenarios, and there are many of them, we might think that the state could do something like this. If we look at where we are right now, we are using somewhere around 5 million dry tons a year biomass. Much of this is going into electricity production. There's a little bit going into biofuels production at the current time.

Of that 30- or 32-million tons that I mentioned might be sustainably available for use, most of that is not being used for energy purposes at this point. As we look out into the future and we think about what policies, what actions, what technology developments we might have in the future, and what we might do with this biomass that we have available, we could potentially do something like this, which is to increase the amount of electricity that we generate. We can increase the amount of biofuels, and of course,

biomethane. Biomethane could go into electricity generation or into biofuels or into other synthesis.

And, of course, out in the future toward 2050 we could be producing increasing amounts of hydrogen if that's the economy we develop.

So we could do this. Technically this might appear to be feasible. The question is whether we really can support this financially, economically and politically. And this is a substantial increase in capacity for biofuels and electricity and the like in a fairly short period of time. We're looking out over two decades here for most of this development. And if we think back over the last two decades and think about what we've done, there's some comparison there you might make.

In any case, if you look at the energy associated with this, again looking at some of the quantities, this basically amounts to about 2500 megawatts of capacity in electricity generation. Again, close to 100 billion cubic feet per year in biomethane. About 1.6 billion gallons per year in biofuels. And out towards 2050 about something over a million tons per year of hydrogen, again,

if we develop that economy.

So we have the resource to do this, and we can be expanding the resource both through dedicated crops and higher -- and, of course, potential for energy from this resource we can be increasing efficiency as we go along.

So, what are some of the estimated impacts of this. Over this period of time in this particular scenario we would be using somewhere around 1.5 billion tons of biomass per year. Now, this does not include the biogas that would already be coming from waste placed in landfills, for example. We have over a billion tons of material in landfills currently which is producing landfill gas. So this is of that annually produced biomass over that period of time out to 2050, we would be using something around this amount of biomass out to that time.

The acquisition cost for this biomass would amount to some $40 billion. In conversion plant investment we would have something around $20 billion. We would have also investment in harvesting and collection and processing infrastructure, as well as product distribution infrastructure.

This might result in something like 16,000 primary jobs associated with this industry. The cost of energy generation might amount to something around $175 billion or close to $200 billion, with a retail value close to 300 billion.

And potentially with about a gigaton or a billion tons of CO2 displacement from this biomass utilization. And, of course, as we build the markets for carbon in California, if we get up to the range of $120 per ton value on this carbon, and it's a substantial economic incentive, somewhere around $30 billion credit value associated with carbon from these activities.

And, of course, we have many savings from fire suppression, health and safety costs and waste disposal costs, as well. So there are a number of benefits associated with this.

We have many technologies in development. We're going to see lots of development, I think, over both the near and the long term here.

We have technologies that offer great promise for increasing efficiency and increasing selectivity in products that we can manufacture. Many of you are, I think, associated with

technology and product development at this time.

And, of course, as we look from where we are right now with our distribution in bioproducts and biofuels and electricity and heat, and think about the technologies that we can develop, we have various trajectories for this development that can occur over time. And, of course, if it's your own technology, you'd like to see it take a trajectory that would wind up in commercialization, I'm sure.

Some of these will make commercial technologies; some of them will not. And, of course, the question is how do we promote this; how do we support the development of clean and efficient technologies in the future so that we can do this development that we're talking about.

The roadmap elements include the vision, of course, which you've just heard from Valentino. In addition, we have the timeframe that we've looked at. This roadmap looks over the period out to 2050. Much of it is concerned with the more near term out to about 2020, 2025.

The Governor's executive order, of course, pays attention to developments out to 2050 with the biofuels; looks at 2010 and 2020 for

electricity development with its 20 percent of the renewable portfolio standard for biomass as part of the renewable component.

The roadmap also has to identify barriers and look at how we're going to overcome these barriers or go around them. We have to look at the research and development that's required to take us where we want to be.

We have an education and outreach component associated with this, which is quite critical to meeting these objectives. And, of course, there is financing and we have to demonstrate technologies, and we then have to deploy these technologies in order to achieve this vision.

And there will be policy and regulations and statutes that will support all of this. And, of course, there's some accountability that has to occur in all this. We have to be able to measure progress. And we also have to be able to maintain sustainable systems and be able to measure the effect of the systems on the environment and make sure that they ar sustainable.

In terms of the roadmap process, the document that you've seen has been put up on the

web for your review. Has been developed through a process of consultation with the Executive Board of the California Biomass Collaborative and the staff of the Collaborative.

The staff has worked very hard on this. And I will point out a couple of people on the staff right now. Martha Gildart, who's sitting down there. Martha, I don't know if you want to raise your hand there. And then Rob Williams, also sitting in the front there. These two individuals have been largely responsible for putting the document in the form you see.

The Executive Board has contributed substantially to this document. You see a number of people in this room right now who serve on the Executive Board and have been very instrumental in helping this document get to where it is now.

And I will point out a few people from the Board just so you know who they are. Tony Symonds sitting in the back there, Tony. John Menke in the front here. And if I miss anybody, make sure -- Ken Krich, who you'll hear from shortly. Fernando Berton, sitting there. Tony Goncalves in the back there.

And see if I see who else is sitting

here -- and then we have Doug Wickizer back there. And let's see, who else do we have here -- I'll probably miss somebody here. Valentino, of course, you've heard from.

Gary Matteson sitting in the front here. Kay Martin there at the front table. Susan Brown. John Shears, and did I miss anybody there on the Executive Board? I want to thank these individuals for the contributions that they've made; they've been substantial. Okay.

So where are we right now? We have this document. We would like your review of this. We want public comment, we want to know what we've missed, what we've done well, what we've not done so well, what we need to do to take this document to final form.

This is an informational meeting to solicit your comment and get your -- to obtain your comment. We will take your comments from today, also written comments should be submitted if you have them to submit by Friday this week. We'd like to get those.

We will then take those comments, make revisions to the document. And put out a revised document. And then move to another public meeting

probably towards the end of October or the first part of November.

There will be a public release of that through the Collaborative website, as well as I think through the Energy Commission. You can correct me if I'm wrong there, Val and Susan.

So, we will invite more public comment as we go along here, moving towards the final roadmap which we would like to have out fairly soon.

So, this is the process. And so we are hoping to get as much comment as we can from you today. And certainly if you have written comments please get those in to us by Friday if possible.

Now, we have a number of other presentations this morning on the agenda. We are going to hear next from Kay Martin, who's going to give us a perspective from the industry on the roadmap and the process and what it means to California to have this roadmap for the industry.

So, Kay.

MS. MARTIN: Good morning. I don't have a PowerPoint presentation but I thought I would stand up here so I can see all of you.

I've been asked to give some

perspectives from industry. And I think I should start by saying that there are many industries that have a stake in bioenergy development in California. We have the solid fuels power plants; we have the agricultural sector; the landfill operators, and certainly the bioproducts manufacturers.

What I'm going to do this morning is give you some perspectives from the Bioenergy Producers Association. We are a collection of private companies dedicated to the commercialization of technologies that can produce power, fuel and chemicals from the full array of biomass, both purpose-grown crops and residuals. And also from plastic wastes.

Our membership includes bioenergy firms, but also utility companies and waste management firms.

We view the roadmap that you have available to you now in draft as a very positive step for informing both policymakers and the public. It calls attention to California's future energy challenge. It delineates the benefits of optimizing biomass resources for the furtherance of California's energy independence policies, and

also for a whole variety of environmental and economic development goals.

It quantifies the state's biomass and the pathways for their development. It identifies some of the major challenges before us, technical, administrative and political. And finally, it offers some actions and proposed strategies for overcoming these goals -- rather, these obstacles.

But from our perspective the roadmap fails to pinpoint the most critical factor we feel in the commercialization of bioindustries in California.

The major barriers to our industries are not technical or even economic. Technologies capable of producing power, fuel and chemicals from biomass wastes and residues on a profitable basis and in full compliance with California environmental standards, are available now.

And, in fact, these bioconversion and biorefinery facilities are being sited in other states. And we expect that the first of these will be operational within 16 to 18 months.

In California the major barrier is a lack of an enabling regulatory structure and a clear permitting pathway for facility siting.

Unless this issue is resolved, the state's goals for bioenergy development, we feel, are severely compromised.

Notably, the bulk of biomass materials that are available for energy development in California, perhaps 90 percent or more, fall into the category of wastes or residuals.

Currently, the perception is that industries that utilize raw waste materials as a feedstock are waste processors or even waste disposers. As such, they frequently fall under the jurisdiction of the Integrated Waste Management Board. And are even regarded as landfills or incinerators when it comes to permitting.

And this permitting hoop is not limited to facilities that simply use urban biomass. We're talking about, for example, an industry that utilizes a thermal gasification process with fermentation to produce ethanol that can easily take a full array of biomass feedstocks. Not only municipal waste residues and urban green or wood waste, but things like rice straw bales, switchgrass, manures, corn stover, orchard prunings and so forth.

The permitting problem is acknowledged by the roadmap, but it is not fully explored or resolved in this document. For example, the document notes two major areas of controversy with the permitting of waste conversion technologies. And these are those that have been raised by opponents.

One is the fear that these facilities could emit toxic air pollutants. A second is that perhaps if we permit these facilities that are waste reduction and recycling activities will be somehow compromised.

The roadmap indicates that in this instance the Waste Board's hands are pretty much tied in lieu of the ability to change statute. And the solutions that are proposed in this document are that perhaps we should do more lifecycle analysis studies as a prelude to potential policy initiatives. It doesn't, however, indicate why it's felt that the opposition will be swayed by these additional studies any more than they have in the past.

Similarly, the action proposed in this document is that within the next three years we try to change statute. Again, it's not indicated

who's going to initiate this legislation, or why this legislation is expected to be any more successful than previous attempts over the last couple years with AB-1090 or AB-2118.

In our view, the real barriers here are political rather than technical. The easiest way to deal with political controversy is to propose additional studies in the furtive hope that this additional data will convince policymakers to take the high road and to make the right decisions or do the right thing.

One commentator recently said politicians love symbolic acts that send attractive messages without any political or financial cost.

On the issue of biomass conversion technologies, the reality is that state government is being held hostage to arguments that are not based in science, and that do not address over-arching policy goals of California, such as strategic energy independence, pollution abatement and economic vitality.

We feel there is a short-term solution; and that is that we de-politicize the production of bioenergy from biomass wastes and residuals by

vetting the environmental and economic characteristics of these industries on the ground.

How do we do this? We need to develop an immediate pathway for commercial scale demonstration of these types of industries. And to do so we only need to look at other states for guidance. How do they do this? How are they doing this.

Step one is to clarify the jurisdictional boundaries of our regulatory agencies. And a good guideline here that's being utilized in other states is that if it walks like a duck and quacks like a duck, it is a duck. In other words, if we take biomass or any other feedstock and convert that into electrons, we're talking about a power plant.

If we take that feedstock and we convert it into biofuels such as ethanol or biodiesel, we're talking about a refinery. These are energy production facilities; they are not waste processing or disposal facilities. And they should be permitted as such.

We don't require any new legislation to permit these facilities in a way that will protect public health and safety, protect the environment,

and also to address local community needs.

And the way we approach this is that the jurisdiction of state waste agencies is limited to the oversight of feedstocks prior to the entering of the process, if these feedstocks are chemically unstable and require jurisdiction.

And the Waste Authority also has jurisdiction over any products, end products, waste products of the industrial process at the back end.

In the middle we're talking about an industrial facility. And jurisdiction of that facility is typically done by the air boards, the water boards and the local land use authority.

Under this scenario reliance is placed on the development and monitoring and enforcement of performance standards for air quality and other environmental issues.

And we have then the opportunity to utilize commercial-scale performance data to resolve environmental questions about these new technologies.

If progress is to come to California, environmentalists, regulatory agencies and the Legislature have to work together with industry

innovators, not against them.

Our industry is prepared to invest private dollars now to demonstrate the commercial viability of technologies that can turn the full spectrum of biomass residuals and wastes into major sources of liquid energy and green power, and do so in a manner that meets state and federal environmental standards.

We request that the roadmap assess the need and support the need to establish a clear permitting pathway for bioindustry siting, and for the coordination of state regulatory agencies in this regard. And this as a critical step in addressing the so-called greening of California.

Thank you very much.

(Applause.)

MS. BROWN: Can I ask a question?

DR. JENKINS: Yeah, Susan.

MS. BROWN: Since you've laid down the gauntlet here, Kay.

(Laughter.)

MS. BROWN: So it's your belief that within existing statutes and regulations it's possible to develop some kind of, for lack of a better description, regulatory guidance which

describes the jurisdictional limits of the agencies, given the feedstock. And you draw a line between that which enters the process and that which is turned into energy or fuel as a result of the process.

Which, to me, begs the question then, under CEQA most of these types -- unless you have a power plant sized at 50 megawatts or greater, most of these permitting decisions then would fall to local governments, the first government to receive an application for a permit, be it a local land use agency or a local air district and that sort.

Am I understanding where you're going with this? I want to understand it, --

MS. MARTIN: Well, that's true of --

MS. BROWN: -- because I think it is --

MS. MARTIN: -- that's true of a landfill, too. I mean the application comes in to the local land use agency. The permit application is processed not only for traditional land use and CEQA issues, but it then goes to the local enforcement agency which is the arm of the Waste Board. It goes to the local air district. And if there are discharges, you know, it ends up at the

Regional Water Quality Control Board.

And so the permitting pathway is there. What we need to, I think, do to expedite permitting of bioindustries in California is to get some agreement amongst the various agencies within Cal-EPA as to where their public health and safety and environmental jurisdictions begin and end.

And I believe that we already have these concerns covered; it's just a matter of how we're going to coordinate the activities of regulatory agencies.

An MOU would be nice. I think that would greatly facilitate what we're trying to accomplish.

DR. JENKINS: Okay. -- comments on the industry perspectives. I think we have a clear need to demonstrate some of these facilities and technologies in California. And hopefully do that in the near term.

Is John Shears still here? Did he have to leave, do you know?

UNIDENTIFIED SPEAKER: -- telephone.

DR. JENKINS: Okay. We were going to hear from John Shears who's with CEERT on

environmental issues associated with the roadmap. I think John was being called out to deal with various regulatory issues and -- sorry, legislative issues and -- oh, he is here. All right.

So, are you ready?

MR. SHEARS: Yeah.

DR. JENKINS: All right. Okay, so John's going to talk to us about environmental issues associated with the roadmap development in California. Thanks, John.

(Pause.)

MR. SHEARS: Well, sorry for that. Got caught in the hall talking with Mike Smith about issues.

I'm just briefly going to -- you know, got a few slides, but won't take a lot of time just to quickly sort of go over the breadth of issues that are of interest from the perspective of the environmental community.

And as we're all aware, the pressing issue economically, it's also a pressing issue from the environmental community, is what's happening with fossil fuels.

Here I've just put up some slides

demonstrating some modeling that we've done here at CEERT showing what (inaudible) projections would look like for oil, gas and coal going forward. But even if you don't buy into that perspective, the challenges we face in the market right now are issues around supply and demand.

These other graphs show how world total production is basically max'd out; essentially the elasticity in production has diminished quite a bit. There's less room. Everything's going flat out. Refining capacity is max'd out. And the slide on the lower right-hand side shows essentially oil tanker capacity, and we're pretty well using all the oil tankers. You know, every one that's out there on the water is just being put to use to move fossil fuels around.

In California this is a slide from the 2003 AB-2076 report. We face this challenge in terms of transportation fuels. The small slide inserted up in the upper left-hand corner, which is also you can see similar projections in the Biomass Collaborative roadmap report, shows on the lower line population projections relative to projections for vehicle miles traveled. And you can see that vehicle miles traveled is expected to

accelerate at a rate faster than population growth.

So the challenge that we have here in California is how to meet, you know, reduce transportation fuel demand and possibly displace it with alternative fuels. This is also a challenge obviously going forward on power production. And alternative fuels, including biofuels, have a place -- a role to play in meeting the state's climate targets.

Here I've shown a pie chart which was actually worked on earlier before the Climate Action Team under the auspices of the California Climate Change Advisory Committee, which was convened under the Energy Commission.

And these are the roughly current greenhouse gas emissions from the state. Going forward to 2020 we're going to increase from just under 500 million metric tons per year to 564 million metric tons of CO2 per year.

And I've highlighted here on both of these slides, the role that biomass resources play in terms of emissions. And I include agricultural soils as a component within that. And there's a slight growth shown in the inventories from the

Climate Change Advisory Committee work.

So, going forward what we'd like to do is essentially cut off our fossil fuel use; and in an ideal sort of world scenario replace our use of fossil biomass, fossil fuels, and to some extent, or to the greatest extent possible, replace that with, you know, current biomass resources.

The challenge that we have going forward with that is we still have sent a huge signal of carbon into the system. And as you'll note on the slide on the right, I've highlighted that we still have 3.2 gigatons of carbon that will be floating around in the system, including, you know, all of the carbon that's been sequestered in terrestrial and marine biomass for quite some time to come.

You may also note that I've put a few little factoids on the bottom of the slide, but sort of the key, one of the key ones is that if we look, you know, to the pace at which we've been going through fossil fuels, and we convert that into net primary production, which is if you harvested all of the new plant growth on the planet on an annual basis, since the mid 1700s we've burned through the equivalent of now probably more on the order of 14,000 years worth

of the net primary production.

So, it sort of gives us an indication of the scale of the challenge that we would have to do to undertake in order to pursue an aggressive biomass policy.

Going forward for California, we have some competing issues that we're going to have to deal with in order to capitalize on biomass production. Key among these is land use issues. If we look at the projections for population growth in the state, quite a bit of the Central Valley, I think on the order, as we go out to 2050 and beyond, we're looking at a loss of on the order of 15 percent of arable lands in the Central Valley.

So we'll have competing land use issues for purpose-grown crops. This also play, of course, in wildfire issues as urban areas expand into certain wildlands. And that links up with forestry issues and what we can do there.

Also going forward on the agricultural side we have to worry about weather, you know, how much the picture will change on water use issues. These are projections taken by the Pacific Institute, which is an organization in Oakland

that works on global water issues.

They've looked at the past projections from past Department of Water Resources water plan updates, and current water plan update for future projections. And plotted these all out to show, you know, how the estimates have varied over each of these updates.

And then they've also shown, you know, some high efficiency scenarios, modeling work that they've done, to show what they think is possible in terms of reducing California's water use.

Those of you who are familiar with the IEPR process know that the water working group did an initial examination of power demand to move water around the state that was -- the initial report was issued, I think, in September. They released an updated and more extensive report in November, or publication in November, released December. Which shows that California's actually using huge amounts, also using huge amounts of electrical power to move water through its infrastructure.

So we have sort of some combined issues here in terms of water use for, you know, purpose-grown crops, what are the implications there. But

also with climate change scenarios and power demand, if we want to, you know, increase power demand from biomass, should we also be looking at ways to increase power use efficiency, especially when it comes to moving water around the state.

Another issue which I've tried to highlight in recent conference talks that I've given is everyone's very much focused on carbon as a climate forcing element. But what's coming to be more a concern in the research community of late is the role that nitrogen plays.

And obviously, based on, you know, as you can see here from these plots that I've provided, nitrogen use, increase of nitrogen emissions is very much related to the development of modern industrial agriculture, of which California is often held up as a shining example.

If we again wish to further intensify agriculture in the state, not only for food crops, but for fiber, biomass, for fuels, products and power, we need to be cognizant of what the other implications are in terms of things like nitrogen fluxes. And as people may or may not be aware, N2O is one of the most powerful greenhouse gases. On the order, depending on the reference you cite

of 270 to 320 times the climate forcing potential of, you know, of carbon dioxide.

As you can see, you know, our N2O emissions have been increasing substantially with the advent of synthetic -- production of synthetic fertilizers through the advent of the Haber Bosch process in 1913. And that nitrogen then making its way through the food and organic systems on the planet.

Part of what we've seen as a result of the advent of the Haber Bosch process is a perturbation in the nitrogen cycle. And, in fact, research scientists no longer refer to it as a nitrogen cycle; they refer to it as a nitrogen cascade.

And this slide is essentially meant to just show how we've completely altered the flows within the nitrogen system on the planet. This slide here is essentially meant to show a little more clearly how we've changed what used to be the nitrogen cycle and converted it into nitrogen cascade by increasing the overall amounts of reactive nitrogen that are now flowing through the world's ecosystems.

This shift in the nitrogen system is of

such concern that there are now major international initiatives looking at how to deal with nitrogen, implications of nitrogen, in terms of global warming, ozone formation and also just on-the-ground ecological impacts through nitrification and similar impacts.

These plots show nitrogen deposition in the western United States. And notably the line that stands out from the rest of the western U.S. is the amount of nitrogen that goes up into the atmosphere, but then be redeposited on land and water. The red line at the top of the graph is California. So we have some huge challenges in terms of dealing with nitrogen in the state.

This is just to show how dynamic, you know, nitrogen is within the ecosystem process. This is a graph essentially focusing on especially ammonia and NOx when it gets into the atmosphere and reacts with combustion products containing sulfur.

In California SOx is not so much an issue anymore. We've been able to drive down, through regulations, SOx emissions. So that's less of a key player here in California. But the formation of ammonium nitrate, which I note at the

top is not really being shown in the graph, has become a much more important reactant that's formed especially in the cool humid months of the winter, and is responsible for forming a significant component of what is called PM2.5.

Now, if we look at our inventories and our understanding of nitrogen fluxes within the State of California, work from the global ozone monitoring experiment raises some issues.

The graph across the top is from Lyatt Jaegle's work. She's at the University of Washington. Showing essentially that the remote sensing measurements of emissions from world soils is much higher than what one would expect based on ground level measurements using bottom-up modeling to try and estimate what total regional NOx emissions would be.

The slide on the left is work from Ron Cohen's group at University of Berkeley showing, again using remote sensing work, differences between what bottom-up models are showing us and what remote sensing is showing us. And it raises questions about whether we have a good handle on our inventories even though California has some of the best inventories on the planet. And also a

separate study on the lower right showing similar sort of picture to Ron Cohen's group.

Another issue that's going to be a concern to the environmental community, especially to environmental justice communities is, you know, what will biorefineries really look like. And this is from a paper by a gentleman in New Zealand who is also now works with OECD, showing all of the different pathways through which we can process biomass.

And the question, of course, is to what extent are facilities that are going to be built to take advantage of these pathways going to have, you know, strict enough emissions controls to have a minimal footprint so that we can, you know, reassure the community that when they see facilities like this being built that they're not seeing, you know, oil refineries or something, built in their neighborhoods.

So we also have to be very cognizant that there's still a lot of distrust up there at the community EJ level when we move forward to actually sort of capitalizing on the biomass resources and building these facilities.

And I'll end there. Thank you.

DR. JENKINS: Any questions for --

(Applause.)

DR. JENKINS: -- John? Fernando has a question.

MR. BERTON: Fernando Berton from the Waste Board. You had mentioned that, going back to your graph of the population growth in California that there's going to be increased competition for arable land.

Would it be you contention, then, that the biomass source will shift from agriculture and maybe some forestry and more to the urban biomass based on those population projections? And if so, we still need to come up with alternatives to landfills and the like based on those estimated population growths.

You just passed it. There. So, using that slide, you talked about the increased competition for ag land. So, in my mind that means there may be less in the way of ag land which would lead to more in the way of urban biomass.

MR. SHEARS: Yeah, as we're both aware, there are challenges there. And the challenge there make a more viable strategy politically, I

think, is if we could move the state to the prospect of having a real good way of separating out clean organics from the rest of the waste stream, so that, you know, there'd be less hesitancy at the community level to allow facilities that would process those organic residuals.

MR. BERTON: Well, that's a laudable goal. I'm not sure how realistic it is. The other thing to keep in mind is one of the proposed solutions is to compost everything. Well, one --

MR. SHEARS: Yeah, that comes with its own challenges.

MR. BERTON: Yes, like ammonia, which is a nitrogen source. Which you point out on the nitrogen cycle.

MR. SHEARS: It's also a challenge for biomethane use at dairies and stuff.

MR. BERTON: Yeah. So, you know, going with Kay's contention that, you know, there are all these different roadblocks and, you know, we're trying to do the right thing. And, I mean, the whole purpose behind air pollution control and the like is to address those issues.

But there's got to be give and take on

both sides. And based on my six-plus years on this issue and others who have gotten more gray hair or lost hair on this issue, I see a lot of give but no take from certain sectors.

MR. SHEARS: You know, part of the reason, you know, I'm involved with the Collaborative and the organization that I work with, I mean we're also involved with EJ and community organizations.

We don't claim to be EJ or community organized, you know, to be of that, you know, that cohort, ourselves. We just work and try to assist them and get their issues voiced.

Part of my purpose in all of this is to try and help get that conversation, elevate that conversation with those organizations. Get everyone looking, thinking more on a systems level, because i think there are solutions pathways. We just need to, you know, we need to get more of that sort of cross-fertilization of ideas and, you know, education and communication going both ways.

And I'm not saying it's easy or it's going to happen quickly, but that's, you know, I agree with you. And part of that is -- part of

our role at CEERT is to help sort of bridge those differences and find ways to get to solutions.

MR. BERTON: So then is that -- you're committing yourself to do that and --

MR. SHEARS: Yeah.

MR. BERTON: Okay, excellent.

MR. SHEARS: -- for sure, I mean, and hopefully with the assistance of the Collaborative.

MR. BERTON: Okay, thanks.

MS. BROWN: Bryan, may I ask a question of John before we move on?

DR. JENKINS: Yeah, Susan, sure.

MS. BROWN: John, I know you can't speak for the entire environmental community, but can you comment on how the environmental community views the waste disposal, forest-fire prevention and climate change benefits of bioenergy?

MR. SHEARS: So, there are two questions there?

MS. BROWN: Well, --

MR. SHEARS: So municipal wastes and then forestry?

MS. BROWN: -- we've asserted, we've asserted in many of our policy documents that

there are benefits for example for forest fire health, for using, you know, biomass from our forests. And there are benefits for waste disposal by diverting waste from landfills. And there are benefits in terms of climate change, potentially, if biomass residues can be properly used for energy production.

So I'm just trying to get a better sense of how the environmental community views these. Benefits or costs?

MR. SHEARS: Yeah, I know for --

MS. BROWN: Is there a -- first of all, there's no unified view is my impression.

MR. SHEARS: Right, yeah. I think on bulk, I mean there's still a broad leeriness on the waste conversion for municipal waste side. On the forestry side I think part of the challenge there stems from, you know, perception of irresponsible actors in the forestry industry. Sort of, you know, then the rest of the industry ends up being sort of painted with the same brush.

And therefore, a lot of the environmental organizations that have concerns about forestry practices to, you know, reduce wildfire, and also, you know, for climate goals,

you know, transfer those trust issues onto the larger programs.

So, the challenge there again is to engage those organizations and, you know, work with Doug and people in forestry, state forestry programs, to show that there won't be, you know, those other ecological impacts through soil compaction and, you know, damage to riparian zones, et cetera, et cetera, that have been associated with, you know, just straight-up commercial logging.

So, I mean, you're right, those are concerns.

MS. BROWN: It's still a very big issue then?

MR. SHEARS: Yeah, yeah, it's still a huge issue. As, you know, anybody that's been following the fight with the inside the Department of Forestry in Oregon State is probably well aware.

DR. JENKINS: Thanks, John. All right, I hope by this time in the morning you have now a sense of what the roadmap has to deal with. There are a number of issues. And I want to get to, try to move this along a little bit because we are

interested in getting to the public comment here.

And a couple other people I wanted to mention here. Lian Duan sitting right here is with the Collaborative, and she's been very -- she's responsible for the map you see up there and the other poster you see. If you get a chance a little bit later on, maybe at lunch, you can take a look at that. It's a fairly detailed map and we are moving towards more network analysis capabilities. Hopefully will allow you to do more preliminary siting studies if you'd like to do that, so we have better resource information available to you.

Also Pete Dempster is taking the blue cards over there. If you have your comments -- by the way, make sure you get your blue card to Pete. Pete's been doing facilities studies. Those of you who are operating facilities now may have seen Pete. And you may see him in the future if you haven't already. So I wanted to acknowledge those contributions, as well.

To get this moving along with what else the roadmap contains we have Ken Krich from University of California, the Center for -- California Institute for Energy and Environment.

And Ken has been largely responsible for working on the background for the roadmap and a lot of the vision part of it associated with looking out towards 2050. And we'll get Ken's presentation up here and try not to take as much time as we did before.

(Pause.)

DR. JENKINS: Okay, so, thank you very much, Ken.

MR. KRICH: Okay. Good morning. I think you can read my slide. So, the exercise I worked on was trying to -- when you have a roadmap, I sort of like reading roadmaps, I like to travel, but they're most useful if you actually got an idea where you want to go.

So, as part of this exercise we said, well, what is this state going to look like at 2050 as a result of the work we're doing. So that's the destination, what is it going to look like.

So we started describing one possible destination. It was kind of a fun exercise. All of you follow energy issues; you can all, I'm sure, do your own version of what the world of California will look like in 2050.

The University of California did a study in 2003, predicted 52 million people in 2050. The bulk of the growth comes from international immigration, not from birth rates or domestic in-and-out migration, which has some interesting implications. And it's basically going to be in the Central Valley, in the Inland Empire, which are, of course, hot.

To make this growth happen we're going to have to have a strong economy. If the jobs aren't here people aren't going to come. So that's the other assumption. And then we would assume going with it high housing prices, land prices, agriculture still important, but not as large a percentage of the economy. And some of that ag land in the Central Valley is going to be converted to other uses because people are going to be living there.

Now, of course, I'm describing, as I say, a future as if it were the reality. So, climate change, if any of you went to the climate change conference you know that even though we're anticipating a lot of good activity to control this, as we've seen in the State of California, which we hopefully with AB-32, which will

hopefully become national.

Still, we're going to see higher average temperatures by 2050 than today, different vegetation patterns, more risk of fire, smaller snow pack, which has some big implications.

Water usage. The residential demand goes up; there's more people. The ag usage might go up, might go down, depends if we're growing cotton or if we're growing wheat or what we're growing.

More water storage because of the snow pack. Water prices go up. There's a bigger market for water. We're going to be trading water back and forth more than we do now. And, of course, we're going to use the water like we do the energy, much more efficiently, more recycling, more efficient use.

We're going to take the position that the strong environmental ethic the state is famous for will continue with a well-informed electorate. And that goes back to the fact that we're going to have a lot of new immigrants who we need to help understand the issues if they don't already. And the tradition of California in terms of preserving the environment.

The regulations are going to still be strong and effective. We're going to look at different media. And we're going to predict that air and water quality will be better than today, which kind of goes against what most people in California believe, according to surveys, which is that it's going to get worse.

We anticipate by then carbon will be priced in the market. We're going to have cap-and-trade or taxes or usage fees or something else so that -- which is going to increase the cost for fossil fuel. But the economy should be able to adjust to it without too much disruption.

We already talked about waste, but I look at these waste -- there won't be as much waste because there's going to be more avoidance of it in the production process. And what disposal sites we have will be known as (inaudible) or bioreactors or energy sources.

We're going to, of course, need more energy services, and that doesn't mean more energy. The obvious thing is we don't want electricity, we want lights. We don't want air conditioning, we want a cool house.

So, energy services will go up in the

hot inland areas for air conditioning with the higher temperatures. Economy still being strong. More demand for water, of course, as you know pumping water around is a major use of energy and there's going to be more of that. And we may find some desalinization by then. Very energy intensive.

But that's going to be balanced by dramatically improved energy efficiency. The Rosenfeld effect will be the Rosenfeld-squared effect. We're going to see smoothing of demand by demand response and time-of-use pricing. We're going to see all these carbon charges and declining supplies of fossil fuel changing our usage patterns.

For electricity, more renewables, more distributed generation, more efficient conversion technologies. So we're going to find new ways of combusting biomass and getting higher rates of electricity out of it, more use of heat and power; more renewables, except for hydropower, which there will be less of; some new technologies.

So, natural gas, we're expecting North American supplies to be in decline. We'll see more LNG imports, but it won't be enough to make

up for that. There's talk about new sources like methane -- rates and things like that, which we're anticipating will have environmental issues. So overall, higher prices for gas.

Nuclear power, of course, you can take either side of this. You can say nuclear power will be more of it because it's not a greenhouse gas emitter. We think the political opposition will continue to make that a limited opportunity.

Coal. We have a lot of coal in the United States. We anticipate more coal usage, but with better technologies, cleaner technologies, with carbon capture and sequestration. A lot of work being done on that by the WestCar project and others at the Commission. And, of course, the prices going for electricity from coal.

Transmission system is built to support this without stranding resources like Tehachapi wind. And DG fits right into regulation in the infrastructure.

Now going to transportation, as John showed us, we're going to have more people, more cars. Peak oil by 2050 will have been behind us, so we'll see higher prices, declining supplies. We're going to want to get domestic supplies. Now

we would expect to see a lot more public transit, congestion pricing for cars. Much higher fuel efficiency in all modes, not just cars, trucks, planes, trains, ships. And all kinds of new fuel technologies in play, hybrids, Fischer Tropsch products, cellulosic ethanol, biodiesel, hydrogen out past maybe 2025.

The supply of biomass will come from energy crops, from all the ag residues, forestry residues, urban waste. We'll have new technologies that they're working on; there's pioneering work starting up on synthetic biology and nanotechnology and the Helios project at Lawrence Berkeley they're getting started on. So we're going to see new plants and new processes.

Now, as we said, there's going to be less farming acreage. It's going to be more expensive to farm because water and fuel get more expensive; the land gets more expensive. The carbon tax thing and the other issues are going to raise the value of biomass energy. And there will be some impact on food and feed and fiber prices as the farmers have a competitive place to sell their crops into the energy market.

The forests will be sustainably managed

for forest health; also watershed health. As we said, water's a big issue. And if we don't have the snow pack, we need to have healthy watersheds to help store the water. And that'll be a good place to sequester carbon.

We'll be collecting biomass to reduce the fire risk. Finding better ways to collect and harvest that material. And carbon sequestration will be another source of income for forestry land.

So, for electricity and heat, biomass will be used more efficiently, more technologically advanced combustion processes, gasification processes, widespread use of more efficient anaerobic digestion for organic waste products. And farm tipping fees and carbon credits, environmental regulations will make all this more economically efficient.

Transportation fuels, the biomass will contribute the cellulosic ethanol from all kinds of organic sources, biodiesel, biomethane, biohydrogen, this is the contribution.

And then the biomass -- biorefineries will be producing the chemicals we're now getting from fossil fuels. Some of that, the fertilizer

from natural gas will be replaced by the compost and soil amendments from the anaerobic digestion.

And we're looking for a world where we don't have anything called waste products anymore. We just have byproducts and residuals that are put into other purposes.

That's it, thank you.

(Applause.)

DR. JENKINS: All right, thanks, Ken. Okay, so we have a basis here now for looking out to the future. We're going to look at some of the details of the biomass roadmap, itself, and some of the goals and objectives and some of the actions that we think need to occur.

And then we're, of course, doing this to set the background for your own comments.

So, starting us off is Martha Gildart with the Biomass Collaborative; and then she'll be followed by Rob Williams, and then maybe back to you. Thanks, Martha.

MS. GILDART: Okay, well, to reach this vision that Ken has laid out for us where everything works so well, the Biomass Collaborative has established within the roadmap five goals, and describes objectives.

Very briefly, those goals are to increase sustainable production and improve acquisition of biomass so that we can use it. Increase production of the biopower heat and cooling that can be produced from biomass.

Increase the production and improve environmental performance of renewable biofuels. Increase the production of biobased products. And finally, improve knowledge on the use of biomass and its effects, and disseminate that information to decisionmakers and to the public.

In order to achieve those goals the Board has discussed how to group common actions, if you will, and we have defined five key areas that we're calling priority areas for actions to be undertaken. And these actions are the steps that lead us to those goals.

So, the five priority areas are access to the resource, itself; how to produce it and increase the supply. How to bring those resources, as a feedstock, into the market so they can be used by processors and production facilities.

The market expansion for those products; how to get to the markets; how to distribute it to

the public; what sorts of technologies are necessary to produce those products.

There's a series of priority actions that we need to take to improve some of these technologies, understand better the environmental impacts, how to demonstrate these different technologies and show that it can be done.

Taking that information then before the public to provide public education, informed decisionmakers, provide training to the industry and people, themselves, who will be producing these new technologies and products. And finally, what are the policy actions, what kinds of regulations and statutes have to be changed or adjusted to allow and accommodate all these.

Now, because we're running a little bit behind, I'm going to try and do this very quickly. I'm hoping that most of you will have downloaded the report and read through some of the chapter five, which is, I would say, the heart of the matter, where we've listed more specific recommendations.

But under each of those five areas there are fairly major actions that we are recommending taking. One is to require the use of best

practices for the sustainable development of the feedstock supply. And include independent certification of these sustainable practices in areas such as land use, environmental regulation, resource monitoring, making sure that we're not depleting soils by over-harvesting of biomass. How to produce dedicated biomass crops; what areas would be appropriate for that, what amounts.

We want to improve the collection and transport systems for the biomass materials. Accommodating things such as the seasonality. You will notice in agricultural crops not only are they widely dispersed, as is shown in the map there that Lian has produced, but they're very seasonal. And may pose problems in the storage, collection and use of those materials.

One way to do this is to provide co-location sites where biomass facilities can be sited that would take these materials and produce the products and follow a setup such as the enterprise zones that are established around the state. And have these biomass feedstocks actually be marketed and bid on much as any other product. And establish specific biomass commodity markets.

Once that's done, once that feedstock

has become more readily available and of value, then these co-location sites or independent sites around need to have a way to provide their product into the market. So, with biopower plants and biorefineries, distributed generation, they will need access to transmission lines; they'll need access to gas pipelines if we're using landfill gas or wastewater treatment, digester gas. So we need to provide the physical capacity to deliver these products to the markets.

In order to do that, to expand these markets, to provide that infrastructure, there are various funding and incentive mechanisms that are discussed in the report and recommended, whether it's a variety of tax credits, carbon taxes, low-interest loans, guarantee loan programs. Long-term contracting; that's something that's been identified as very important to a lot of the biopower industry, is the need to have contracts for multiyear out in order to get the financing from financial institutions with a guaranteed price structure so that they know what the return will be on the investment.

There are regulatory incentives where we identify the environmental benefits that are

provided by the use of biomass, and may provide either environmental credits or emission offsets to assist in the siting of the facilities.

As I mentioned earlier, the infrastructure improvements for transmission and how to have like fueling stations. So if people want to use E-85 in their vehicles, there are not sufficient gas stations now that can handle that. So how to set that up in a way first to demonstrate its viability and then spread it out to the public as a whole.

And then that leads us to this whole next issue of where do we make these improvements. How do we improve the technologies and the infrastructure. And that's what Rob Williams is going to address here.

MR. WILLIAMS: Thanks, Martha. Moving right along here. So research, development and demonstration, we feel, would play a big part in achieving the vision of biomass, sustainable biomass industry in the future for California.

Some of the reasons for research, development and demonstration program are, for one thing, California's behind other states, other countries and other regions of the world with

respect to bioenergy technology systems and analysis.

Research is needed if the state is to become a leader in these technologies and create their own industry, rather than import technologies and systems.

Research is needed to develop instate biomass resources for instate biofuels production, instead of just importing other biomass for our own production needs.

Research will help California to compete, better compete in the markets for bioenergy and technology. It'll also help California develop new industries and invigorate the existing bioenergy industry. And successful bioenergy economy, which is helped by instate development and demonstration, will also contribute to real economies and economic development.

The RD&D section is section 5.3 in the full roadmap. We've listed 64 individual actions in this area. And it's also listed out in tables A-3, A, B and C in the appendix.

This section is divided into six categories of actions related to research and

development. Sustainability and access of the resource -- the sustainability of the resource and access to the resource is one area; feedstock processing systems improvEment is another area.

Bioscience and biotechnology, biomass conversion systems and technologies. Systems analysis for understanding lifecycle carbon, other lifecycle environmental impacts and developing ways to monetize societal benefits to help improve economies of a project. And knowledge and information resources.

For sustainability and access to the resource base, best practices need to either be identified and applied. If they're -- we need to identify the knowledge gaps in best practices for harvesting cultural -- silvaculture harvesting, transport, et cetera. And update and fill in these determine best practices where we don't know them currently.

WE need to improve the inventory assessment methods, including better understanding of how to determine the technical availability from a gross estimate. We'd like to try to better adapt remote sensing technologies for better resolution of the inventory, as well as

monitoring, over the long term, sustainability of the resource.

Part of the resource base in the state will probably, if the state's going to develop a large biofuels industry, part of the biomass will come from instate dedicated crops, we believe. So we need to evaluate the potential for the state to produce dedicated crops, including starch, sugar and oil crops for conventional biofuels, as well as lignocellulosic crops for the second generation, so-called second generation gasoline replacements and diesel replacement, as well.

The long term sustainability of dedicated energy cropping systems needs to be determined, and improved, where necessary. And there may be a large potential for energy crops to be used on marginal or out-of-production agricultural lands to help in remediation or to improve economics of the marginal crops. Some of that information needs to be developed and investigated.

The infrastructure-related research mostly having to do with the fungibility of biofuels and the existing petroleum distribution system. Are there other biofuels that may be more

appropriate for long-term future than ethanol; fuels that may work much better in the existing distribution system.

Also infrastructure related actions to help bioenergy, bioelectricity, would be to come up with some innovative cofiring options for California power systems, since we don't have a large installed coal capacity instate for electricity. There are other possible cofiring applications in California's fossil electricity system.

Feedstock processing actions involve improving harvesting systems, densification at the harvesting site for easier transport. And logistics analysis and optimization for storage, transport and preprocessing.

Biosciences and biotechnology are perceived to be a large -- have a large future in California, the U.S. and other regions for producing crops and fuels. So, in the roadmap it recommends that we develop a better understanding of biosciences and biotechnology as it relates to bioenergy.

This has to do with modification of plant properties; those of energy, for instance,

increasing cellulose to lignin ratio; developing inplant enzyme systems for easier hydrolysis; enhanced yields of properties that are desired; and reduce agronomic inputs.

There's a large amount of activity currently in biosciences and biotechnology for energy. The state should try to leverage its funds where possible to increase those federal dollars to come to California for California research.

The state should participate in international research programs in this area. And always where we can adapt and build upon federal results.

The state should also establish a program to develop cellulase and other enzymes that are suitable for California feedstocks. A large part of the work in the U.S. is in this area is for corn stover and switchgrass, which may or may not be feedstocks California is interested in developing or will be able to develop.

So, the state should then look at what crops would be useful that we want to develop for high yielding cellulose systems.

The research section has a large part

that's addressing biomass conversions systems, including thermochemical and biochemical systems; landfill bioreactors have a section; hydrogen production from biomass is discussed in some of the actions listed, as well as biorefinery technologies and systems.

So, thermochemical conversion, there is a need to demonstrate in the state, of course, advanced heat power and syngas systems to improve existing performance of the electricity industry. But also to improve environmental performance of some of the smaller or modular systems that may be more accessible to the distributed nature of the resource.

Some of these thermochemical systems naturally lead into biofuels production in integrated refinery systems. So, early development for heat and power with integrated gasifiers and combined cycles should lead to knowledge and expertise and learning in the Fischer Tropsch and syngas-to-liquids technology systems.

The biochemical conversion tasks, most of them are, as we listed in the roadmap, deal with anaerobic digestion of MSW components, food

and food processor residues. So there's some actions about trying to better understand the resource, food processor wastes and food wastes.

Develop better knowledge and microbiology of understanding for better biogas and hydrogen production from fermentation techniques.

Landfill bioreactors have the potential to increase the life of a landfill, or by increasing rate of degradation and methane production. There are certain task items listed for further research at landfill bioreactors.

Hydrogen production from biomass. Biomass can be a significant source of renewable hydrogen. If the source hydrogen economy comes to pass, pathways for hydrogen production from biomass include reformation of syngas and methane from biomass, as well as biological production through biophotolysis and fermentive pathways.

The biorefinery and technology systems discuss the need to demonstrate in California and on California feedstocks biorefineries and advanced biorefineries that integrate thermochemical and the biochemical platforms are also recommended.

One of the reasons for this recommendation is that thermal -- biomass-to-liquid systems through thermochemical theoretically have very high yields and very low lifecycle carbon associated with them. And it's recommended that there be work to help develop these.

Systems analysis is a very important section of the roadmap and for the future of sustainable use of biomass in the state. Good understanding of the system's performance is important for optimizing a facility and insuring that the full lifecycle impacts are accounted for, including lifecycle carbon and other environmental impacts.

You know, we continually assert that there's this large benefit to society of utilizing bioenergy and managing biomass, but we have a hard time assigning a value, a dollar value to those benefits. So part of a rigorous lifecycle analysis procedure would help in coming up with dollar values to assign to the project.

There's socioeconomic impacts that need to be analyzed or studied or understood by policymakers and project developers. And, you

know, if biomass development becomes a large enough industry there will be land and water competition issues.

Another potential impact are climate change impacts on productivity of biomass. Those are activities and questions that need to be answered.

And we also think that biomass research centers, establishment of a biomass research center or centers in the state is critical to improving the knowledge base, fostering development of new technologies, and allowing better understanding of full lifecycle performance of these systems.

If these centers are located at universities then we can also train up engineers, scientists and other professionals and offer degree in the field.

A biomass research center should support the full range of research from basic biosciences to crop production and agronomic performance, conversion technologies and up to the integrated processing systems and techniques.

We should also be including expertise in economics, systems analysis, public policy and

environmental review and permitting. These will allow us to develop and maintain institutional knowledge, contribute to public outreach, et cetera.

And another important function of a biomass research center would be to serve as a proving ground for technologies developed elsewhere, where they can be independently evaluated.

The federal RD&D roadmap, recently the Technical Advisory Committee for the federal roadmap met in Sacramento; met here in this room. And they released their recommendations for their current fiscal year. And it's encouraging to see that many of their recommendations are consistent with what's in the California roadmap, which was discussed with the Technical Advisory Committee in early August.

These are some of the recommendations that are listed. You can go to their website to look at them in detail. They're not in our roadmap currently.

Another priority area is education, training and outreach. This is section 5.4 in the roadmap and table A4 in the appendix. And it

includes tasks on public education, outreach to decisionmakers, consumer information and education, environmental justice training and discussing amongst practitioners and the public. Training of industry and professionals; public education and higher education; and then research extension and technical interaction.

Some of the reasons for education and outreach are that biomass is less well known as a renewable energy source than others. Biomass has many competing uses and issues associated with it that lead to confusion and conflict among the public policymakers, environmental groups, et cetera.

The concept of the CO2 cycle with sustainable biomass is not well understood by a large part of the public, as well. And then for biomass development, public education should play a key role. And then just generally usually better choices and decisions are made with current and accurate information.

So there are a list of tasks involved in education and outreach. They're articulated in the roadmap. I won't read them all off here. They're listed there and you can refer to the

table A4, I believe it was.

And we'll go back and let Martha finish up, and you can get to the public part. Thank you.

MS. GILDART: We heard earlier from Board Member Kay Martin the concerns from the industry on how the policy and regulatory atmosphere of the state should be adjusted, let's say, to foster these new technologies and set clear permitting pathways.

In the roadmap we have attempted to identify some of the obstacles that have been created, maybe inadvertently, by policies and regulations. And have made some recommendations on how to move forward there.

We feel that the policies do need to be comprehensive and allow for innovation and look at the long-term application of these technologies. We want to have a way to account for the externalities. And that is a biomass facility may create a benefit that is not immediately apparent. It doesn't necessarily fit into the standard mode of other businesses, industries or operations.

And we would like to have the environmental pluses and minuses carefully

weighed, maybe through some of the research programs Rob was talking about. And systems put into place to allow for that acknowledgement.

Some of the ways that can be done is to go through carbon markets, having people be able to bank carbon reductions, emissions of carbon compounds, and sell them to those who are unable to make those reductions.

We can provide renewable energy credits or allow emission offsets for certain kinds of performance by biomass facilities. There are fuel standards that can be established, requiring certain blends of liquid fuels or solid fuels, and credits provided to those providing those fuels.

We feel that it's very important to allow for performance-based standards, not just a prescriptive standard that sets a flat rate or a flat requirement on offsets. We think that the access to transmission systems is critical for some of the biopower facilities; and that there needs to be a revision to some of the standards on what sorts of equipment are connected; how the electricity production and use by any of these facilities is actually accounted for. If it supplies it to the system and pulls it back at a

later time, how does that net metering get credited.

There are requirements to protect and allow harvesting of biomass from the forests. You've heard of much of the controversy that surrounds the fuel thinnings programs and proposals; and, at the same time, the huge costs of fighting these forest fires that have become larger and larger year by year as materials build up in the forests.

So, systems that would allow the extraction of the excess fuels in a way that is protective of soils and waters and habitat.

One of the big issues are protecting working landscapes and providing agriculture buffers. You saw some of the slides that John Shears presented that urban areas, particularly in the Central Valley, are expected to grow. And how does one allow for production of biomass, whether it's food or fuel or fiber, and for accommodating urban growth. So there are needs to look very carefully at zoning issues and protecting those working lands.

Credits for alternative fuel use. The facilities that switch to some of these new

biofuels perhaps can be given credits that would allow them to move forward on other venues.

Requirements that the state put its purchasing power behind these new technologies and have the state require to purchase ethanol fuels and flexible fuel vehicles in their fleets; or recycled paper content; or use of biopower from a biomass generator.

There are earlier discussed a need in the market development section for establishing the biomass zones where they could take advantage of things like environmental impact reports done for the entire location, the entire zone; low-interest loans, possibly low-cost utilities provided. And having the state's authority behind that.

The development of best management practices that could be enforced either through state agencies or through the industry, itself, to regulate itself and understand what the best way is to produce, harvest, grow, collect, transport these materials.

And then there's the issue on the environmental justice to make sure that communities that might be affected by these sorts

of practices or facilities have a voice in the design and siting and setup of all these facilities.

So, very briefly, that is the content of the roadmap. What we want to do after the break is take comments from the public. But for those of you who do not provide spoken comments today, we do have a website where the report can be downloaded and comments can be submitted at that email, mcgildart@ucdavis.edu.

So, thank you. Bryan.

(Applause.)

DR. JENKINS: Okay, thanks, Martha and Rob, for presenting the roadmap there.

I think you get a sense of the intricate detail here that's included in the report and the issues.

Of course, all of this has to somehow be translated into action both on the part of the state and on the part of the industry. So that's what we have to work towards.

And at this point we're sort of back on schedule. We were going to begin public comments at 11:00, and I think we should do that. There may be some other people who want to come in here

for your comments.

So I'm going to suggest we take a ten-minute break. We have at least one PowerPoint presentation we need to load up on the public comments anyway. So we're going to be dealing with computers here, and not to waste your time.

Let's return at 11:00. And if you have a PowerPoint presentation you wish to give as part of the comment, could you please get that to me now. Thank you.

(Brief recess.)

DR. JENKINS: Martha's going to run down the list of comments. And, again, thank you for coming today and look forward to hearing your comments.

The question is, do we want comments on comments. I suppose that if there are questions we can open that up, as long as the speaker or the individual commenter wishes to receive those questions.

So, with that, it will be up to the individual speaker as to whether they wish to answer questions. All right. Okay. We'll begin.

MS. GILDART: Okay, well, our first speaker is Matthew Summers, who is with REI

International. And he came very prepared with a slide presentation.

MR. SUMMERS: Very prepared; thank you, Martha.

Excuse me this morning, I'm still recovering from the Ralston fire. We were smoked out up in Auburn for several days, so got a little bit of a stuffy nose.

Just wanted to make a few comments on the report and present some of the research we've done at the Renewable Energy Institute here in Sacramento. And introduce myself, as well. I recently started with them as their Manager of Renewable Fuels Research.

I think my first comment would be that it was a very thorough and readable report; and I thank Dr. Jenkins and his staff and the Collaborative Board and everybody who contributed to it.

I think any report that talks about the potential energy from garlic and onions must be a pretty good report. But, well written, and a good job.

Just a couple of comments. The first one is that kind of the cool thing about energy

chemistry in this field is there's lots of ways to get from A to B, A being biomass and B being energy fuels, chemicals, those kinds of things. So there's also lots of Bs to get to, as well.

And what we've tried to focus on at REI is technologies that meet certain criteria because there are so many options. I think in total 450 or so technologies have been looked at in some form or another by REI. And these are kind of what we see as kind of the main criteria that a technology has to meet. And I think this fits in pretty well with what was defined there in the report, as well.

Technically feasible; energy efficient; environmentally friendly; economically viable; and sociopolitically acceptable.

AnD I've got economically viable there this morning in red because I think maybe the report could use maybe a little more emphasis on that topic. And I just wanted to bring one more slide that kind of shows some comparisons we've done between technologies, not as, you know, this is the be-all/end-all, but just to say that we don't want to give short shrift to any technology that might have potential.

And just again emphasize the need for looking at economics. Because really, you know, I think some billion-dollar numbers were thrown around this morning. We're going to need private investment to make this happen. So, economically viable's going to be a real critical component.

So, in trying to compare technologies with sort of the same financial metrics, that can be pretty difficult to do. You need good data, a lot of this work's been done on a bench or prototype scale.

And so this is some work that's come out of our shop. It's going to be published in Environmental Science and Technology in April 2007. So it's in the works right now. And so just to make it clear there's red x's there, but all of those are intended to be sort of ranges, so really the bubble should be up where the red x's, kind of centered on where the red x's are.

But this is just a little bit about economics, the way we see the world of biomass. And so down on the bottom in terms of, and we've got sort of profit or loss per ton, and then we've got return on investment. And this would be a biomass conversion plan with forest wood

feedstock, which is the subject of the article.

And so combustion electricity kind of falls in the, you know, economically unfeasible range. Biorefinery type ethanol production, and electricity, different types of electricity, sort of advanced electricity, so combined this -- ITCC is combined combustion and thermochemical and combustion and then thermochemical electricity. So more of like a hydrogasification type process.

Thermochemical diesel production and thermochemical ethanol and electricity production, sort of all in the same range. And so I think really what we're just, our main point is that we see a lot of promise in the thermochemical area.

And I think our read of the report maybe was a little bit off base after talking to Dr. Jenkins, because we were kind of seeing a biorefinery as defined as sort of a fermentation type platform; whereas if you really read into the report, I think it's allowing for both biochemical and thermochemical equally.

But I think we want to make sure that California doesn't go off on a path that kind of feel like some of the federal funding went off that direction, is now being pulled back into just

focusing on fermentation type conversion. And feel like it needs at least a equal platform in terms of research and development funding.

We agree that research on all viable technology is needed. I think Rob just gave an excellent presentation on that. And that mainly that there should be some equal emphasis on different approaches to achieving renewable fuels and renewable energy.

So, I think I'll end with that. And I'll gladly take any questions from all you folks here, since I know most of you anyway.

So, Val.

DR. TIANGCO: I know we need to get details on your assumption on, for example, the capital costs --

DR. JENKINS: Val, could you introduce yourself, please.

DR. TIANGCO: Oh. My name is Val Tiangco; I'm with PIER renewables, California Energy Commission.

In your VuGraphs what are your assumed capital costs like, for example, combustion to electricity production, the thermochemical electricity, are you assuming gasification there?

MR. SUMMERS: Which one?

DR. TIANGCO: And what's the capital cost?

MR. SUMMERS: There's hundreds of assumptions and a spreadsheet for every one of these. And in fact, most of them are a combination of several technologies. So, probably the -- I mean I don't recall any of the specific numbers, but there's definitely assumptions. And I think really the purpose of this at this point is not to argue about the nitty-gritty, but mainly to just say that, you know, all these technologies have to be economically viable and we need to equally emphasize research and development in all of them. I think that's the main point here.

But, Val, I'll take you up on being a reviewer of the article; that'd be great.

DR. TIANGCO: Okay, thank you.

MR. SUMMERS: Okay.

(Laughter.)

MR. SUMMERS: We'll leave it at that. Anything else? Okay, thank you very much. And thank you, Biomass Collaborative.

MS. GILDART: Well, thank you, Matthew. The second speaker is Michael Theroux who's with

Theroux Environmental.

MR. THEROUX: Good morning, and excellent work, folks. Your attention to detail has been amazing. Michael Theroux, Theroux Environmental. At least that's the way my daddy says it.

I have three comments this morning; I'll keep them brief. First, we're talking about clean energies and clean fuels, but clean compared to what. The core question of what we're trying to do is something that I needed to think long and hard on, on my task force work in Los Angeles County, Integrated Waste Management Task Force, and, again, with the City of Los Angeles.

And I came to the conclusion that it was a restating of the EPA's basic goal for their work in priority pollutants. They refer to what we're trying to do here as incremental mitigation. I'd like to take that a make it a little simpler. Says we take out the old and dirty and put in the clean and new.

But we need to be able to define the metrics by which we determine that something is clean or cleaner. And we need to be able to do so across many different points. The EPA was focused

on dioxins. It certainly is a difficult question for many of the areas that we're pursuing.

But if it is difficult, and indeed we are replacing something that is worse in terms of that particular pollutant, dioxin and the furans and the congeners, then the difference, the metric that defines the difference between how much of mitigation that we're producing with that new tool for the amount that we're replacing is very critical to where we're going.

So I would ask that as we move forward with the roadmap itself, we focus a little bit on what we're replacing, and how dirty it was, on a per-ton basis, per-unit time basis, per-capita basis, per-gallon fuel basis, however we look at that, we need an incremental mitigation base as a metric for what we're replacing.

My second comment has to do with a tendency that I see across the board in the perspective of the agencies to look at the emerging technologies, and just as guilty, those technology developers as they move their pieces and new tools forward. It's the old thing of my toy is the best on the block it does everything with everything.

The agencies and, to a certain degree, the assessment of the Collaborative seems to have indicated that we will have a best actor; and yet what I see instead is we just simply haven't defined niches.

So I would ask that as we move the groups of technologies forward, that we refrain from making a call in anything other than whether or not they're clean enough according to our standards, and wait for the placement in the market that will emerge as we add our best available control technologies and as we better define that market, itself. So this is a question of market segregation more than one tool fits all.

Along the same lines we must look to multi-technology process flows; and certainly we find that in the emerging technologies right now. We're not just looking at thermal, we're looking at thermal and biochemical and biological, and a combination process flow that needs to be capable of addressing a broad diversity of feedstock and creating a broad diversity of products.

In addressing the development of our infrastructure I would suggest that there is a question, two pieces of the puzzle that have to do

with the infrastructure and preprocessing.

We need to be able to move things from a distance out in the hinterland into a central core refining station. It is true that most of our organic products are relatively unstable, in that they are unstable as we work with them; they rot; they fall apart; they don't do what we want them to. We need to be able to stabilize those as intermediary products.

I suggest that our smaller modular capabilities can be applied at the sources of those feedstocks to help collect and use a portion of that material, whatever it happens to be, with the diverse technologies that we have and the diverse feedstocks that are available, at the location, at the source.

And in the studies that I've done on the ground over the last decade, what I see is that we can pay for the acquisition and preprocessing of five to seven times more than we can actually use at that rural community or at that agricultural station or that small urban management place of that material.

That means then that if we're not careful we'll end up like we were back when

(inaudible) was piling up in moldering piles of newspaper. The problem then will be what to do with that massive amount that we've collected.

Because we do need to get the long-term contracts. And in order to do that we have to have an operating crew on a ten-year contract basis that's bankable. And in order to do that, we must take some of the investment capitalization for the core biorefineries that are discussed and disburse that to the sources of the feedstock with modular capabilities. That provides a cascade of the excess feedstock toward the regional hub.

I'll leave it at that. Those three pieces are what I see as areas perhaps that the roadmap, itself, I would like to see greater development on. If there are questions, I'd be happy to address them.

DR. JENKINS: Michael, I have a question for you. I want to clarify something you said. You had indicated that the Collaborative roadmap or the draft document at the present tends to focus on a best actor for technologies. And your comment was, I think, we need to look at multi-technologies and multiple ways of doing this.

From my perception what we had attempted

to do was to define this, that the policies and the approach needs to be flexible and it needs to allow for innovation, which would include any kind of technology, so we were not trying to be prescriptive.

Is it your sense that the report is overly prescriptive in its technology approach?

MR. THEROUX: Because of a specific reality that I find in the industry, itself, that each of these technologies makes the assumption that they can do everything. And because that's the condition, my toy does everything with everything, their apparent niche is extremely broad. What we'll end up with is, no, that tool fits this particularly well.

So I would ask that as we move forward we don't so much look at six tools that do everything, but six tools that in the future, as they're developed and defined, will sort themselves out into the marketplace better.

So, from my perspective, the roadmap then could assist in that, in perhaps adjusting that niche separation be parallel to technology development and help define where these particular tools do optimal good.

DR. JENKINS: Okay, thank you. I think I need to talk to you some more about that.

MS. GILDART: Okay, at the moment we have a third and last speaker, unless anyone else has a blue card and wishes to speak. And this is Brett Storey with Placer County.

MR. STOREY: First of all, thank you. My name is Brett Storey; I am a Biomass Project Manager for Placer County. And thank you for letting us comment on it.

First of all I want to say I'm relatively new to this business, and as a taxpayer I really like the report; I like the roadmap; I like the approach. And as a project manager, I like most of it, okay. And then I'll get to the part I think could be stronger.

One of my jobs is to develop biomass utilization techniques. We've got a large forested area in Placer County. The two regions that are main are Lake Tahoe, which, if you've ever tried to get anything done at Lake Tahoe, I'm told there are at least 26 major organizations that you have to get to agree. And I don't know what that means yet, but I'm working on it.

And then we have the lower part, which

someone mentioned the Ralston fire; as of Monday I am not only biomass project manager, but now I'm a watershed project manager. I have to go deal with what happened in the aftermath of the fire, which is good because I need to know that for a lot of reasons.

But, you know, the way I look at it, in order for me to move my job forward, which is to find a way to use all this material that we do need to clean from the forest, I have to have four things. And those four things are the money to develop and invest in whatever technology is the right technology for our area. And quite frankly, I've had people who believe in this and want to give us money and want to invest in our County because we have, I think, a large forested amount of material. So I'm relatively comfortable that I can get the money to do that.

You need to have the community accept that. Well, you just have to drive up to Foresthill or Lake Tahoe and they'll accept anything that helps them not have fires.

You need to have no one to sue you. And you were talking from the environmental community, we've actually got the League to Save Lake Tahoe

on board with us because we've invited them in to be a part of our process. And they like our approach. So I'm satisfied.

The last one is the ability to build the facility, to get the permits, to do the environmental.

And right now the first three are easy; the fourth is not going to be easy. You know, we have the need for a stationary source, meaning a new facility. We have some air pollution control guidelines that currently in Placer County will not allow us to put any new facilities in. Yet I could walk over a couple hundred yards to Nevada County, or the other side of the Lake to the State of Nevada, and I can put just about any facility I want up.

Now, I don't mean to tell on them, and don't go off and stop them from doing it, but I guess what I'm talking about is if it's the right thing to do, it's the right thing to do. And that theme was coming across in a lot of different speakers.

You know, we can show, and I think many of the technologists behind me can show that you can get a 90 to 99 percent less toxics put into

the air than an open burning. And in our County there still is a lot of open burning that goes on. So we can prove that and we can show that.

And I'm getting now around to what I'd like to say about the roadmap. While it addresses regulatory incentives as a high priority area, I believe and we in the County believe that there should be a stronger solution path for areas, local government areas like ourselves that would allow us the ability to produce that cleaner energy in whatever form makes sense for those communities.

And I don't know whether I'm going to go so far as to suggest that it be on the goals and objectives list, because the five you have there are wonderful goals and objectives. The point for us is, though, if we can't get a permit to put anything up, I can't achieve any of those goals. If I can get a permit I can achieve every one of those goals on the right scale for our County.

So, I'd just like to draw to the attention to the Commission that I believe the roadmap needs to be stronger in that area. I think everything else, as I said earlier, is excellent. I think the technology will continue

to build. And I think you'll find the businesses wanting to come.

In fact, I have two out-of-state businesses that want to come build a fuel source, whether that's ethanol or mixed alcohols, in our County. And right now I'm cultivating them, but there's really not a lot I can do to move forward until we reach that milestone of either changing the regulations or getting some flexibility in that.

We're doing our part. Actually we've met with the state, and we've met at the federal government to try to get some flexibility. We have our own air pollution control officer for our County involved in our process. And we are going after not only funding, but projects jointly worked with the EPA so that we can prove these theories on the ground in our County. And hopefully that will help everyone else.

And I have one last statement. I came late; I apologize. Are we going to get copies of the electronic versions? Because many of them we couldn't see from in the audience. So I couldn't really tell what was going on in a lot of that.

DR. JENKINS: Thanks, Brett. I think

what we'll do is put copies of the presentations up on the Collaborative website so everybody has those available.

MR. STOREY: Okay, great.

DR. JENKINS: Thank you very much.

MS. GILDART: I have a question.

DR. JENKINS: Sure.

MS. GILDART: You were talking about the, was it the Ralston fire there, near Foresthill --

MR. STOREY: Um-hum.

MS. GILDART: -- and sort of it's a wake-up call to people in the locale. One of the things we run into in the permitting issue is the emissions offset for some of these facilities.

MR. STOREY: Right.

MS. GILDART: And while everyone acknowledges that clearing material from the forests can reduce the likelihood of the huge forest fires, it becomes difficult to define it as kind of emission offset program because these forest fires are not predictable, they're not regular, their emission offset does not meet the criteria of being permanent, real and enforceable.

MR. STOREY: Right.

MS. GILDART: Is this anything that you've discussed with your local district?

MR. STOREY: Absolutely, yes, yes. You're right. The open wildfire, there is nothing predictable about that. Although I will say that the Forest Service and CDF, they do a great job of predicting where it's going to go and stopping it. So that technology, at least, has come far.

What is predictable and reliable, though, is there is open burning. There is open burning in Lake Tahoe; there's open burning in various parts of all counties in the forested regions. And what happens is there is a finite, obviously, amount of days where you can burn in the open, and they have to go through a permitting process to get that accomplished.

But that's known; it's reliable; it happens every year. And that number is only going to increase as the technology gets stronger and the ability to predict days that you could actually burn something that it wouldn't impact everyone's both health and recreation concerns. And we have that throughout our County.

Now, one of the things that we're doing is we're working that with our air pollution

control officer and the federal EPA to talk about that as a piece of just what you're asking. Because it is hard to get that offset with.

I will make one other plug for our County Supervisors. They've actually authorized some money for me in my program to take those piles that have been cleared from the forest by either the Forest Service or fire protection districts or homeowners that normally would be set aside in piles and requested to burn this fall and next fall, they've actually given me money where we have a program now that's starting this week where we are going to ship that material into a van and transport it to the closest biomass facility and have that burned in a control burn.

And thereby, taking that material off the ground for both protection from fire, and also the air quality that it would add to it. And we feel like that's a program that we're going to maintain in the County forever now. At least that's my goal. We're going to look for different types of funding.

In fact, I was just talking with Susan this morning, the California Tahoe Conservancy has seen fit to include some of that in their budget

to help out in Placer and El Dorado County because we are the two most affected California Counties by all that.

So we are trying to do things on a local level, as well as trying to solve that issue you talked about.

MS. GILDART: Do you have a per-ton estimate of the cost of that shipping and hauling or --

MR. STOREY: That's the other thing we're doing is, if you go talk to the folks that buy and sell this fuel, they have a guess about it. And they have it based on certain things. But it's never based on our area. We have some local foresters working with us.

And what our plan is, is to, as we remove these piles, we're going to take what acreage it was pulled off of, what type of material it was, categories, put it in Excel spreadsheets; figure out exactly what you asked, so that we will have an actual known quantity from the Lake Tahoe region, which, of course, is different than the Foresthill region. And that's also the purpose of the program.

Because in the end, my job is really an

incubator. It's to protect the citizens, but it's to hand all this data off to a business that comes in, because we don't want it to be a subsidy, quite frankly. I mean, if it is, it'll never make it.

And we need it to work in our County because of all the forested areas we have; the growth in the homes; the expensiveness of the homes. So we are, in fact, that is one of the things we're capturing and is a piece of our program.

Thank you.

DR. JENKINS: Thanks, Brett.

Okay, well, we had three blue cards submitted. I will ask now from the floor, does anybody have comments that they wish to make, having heard the public comments so far? Or anything else.

Okay, hearing none, thank you very much for coming. We very much enjoyed your participation here today and we look forward to your further comment.

Please get written comments in to us by Friday, if possible. We will accept them at any point, of course, but eventually this document

will become final and it will be difficult to make revisions until the next round sometime later.

So, thank you very much.

(Whereupon, at 11:32 a.m., the Informational Meeting was adjourned.)

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CERTIFICATE OF REPORTER

I, PETER PETTY, an Electronic Reporter, do hereby certify that I am a disinterested person herein; that I recorded the foregoing California Biomass Collaborative Informational Meeting; 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 meeting, nor in any way interested in outcome of said meeting.

IN WITNESS WHEREOF, I have hereunto set my hand this 9th day of October, 2006.