BEFORE THE

CALIFORNIA ENERGY COMMISSION

In the Matter of,	)
	) Docket No. 12-IEP-1D
IEPR Lead Commissioner Workshop	)
Transition to a Clean Economy	)

Lead Commissioner Workshop on Renewable Research and Development, American Recovery and Reinvestment Act, And Financing

CALIFORNIA ENERGY COMMISSION

HEARING ROOM A

1516 NINTH STREET

SACRAMENTO, CALIFORNIA

WEDNESDAY, JUNE 6, 2012

9:04 A.M.

Reported by:
Kent Odell

Commissioners Present:

Robert Weisenmiller
Carla Peterman

Commission Staff Present:

Jim Bartridge
Larry Rillera
Suzanne Korosec
Rizaldo Aldas
Felicia Miller

Also Present (*on phone/WebEx):

Panelists

Panel 1: Renewable Technologies on the Horizon

Lew Milford
George Simons
William Glassley
Jack Brouwer
Mirko Previsic
Lon House
Bryan Hannegan

Panel 2: Financing – Investors Panel

*John Marciano III
Deana Carillo
Roma Cristia-Plant
*Seth Miller
*Dan Adler

Panel 3: American Recovery and Reinvestment Act projects: status and next steps

Keely Wachs
Scott Busa
Scott Galati
Randy Hoyle
Hunter Armistead
Chris Ellison

Case Studies of Project Development:

Ashley Fabrizio

Also Present:

Jesse Jones
*Paul Frankel
Michael Day
*Lisa Malin
Valerie Winn
Amy Nabel
Anita Ladher
Bartek Sudol
Andre Lee

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P R O C E E D I N G S

JUNE 6, 2012 9:04 a.m.

CHAIRMAN WEISENMILLER: Good morning. Ready to start?

MS. KOROSEC: Good morning, everyone. I'm Suzanne Korosec. I manage the Energy Commission's Integrated Energy Policy Report unit.

Welcome to today's Workshop on Renewable Research and Development American Recovery and Reinvestment Act and Financing.

A few quick housekeeping items before we begin. Restrooms are in the atrium, out the double doors and to your left. We have a snack shop on the second floor at the top of the atrium stairs under the white awning. And if there's an emergency and we need to evacuate the building please following the staff outside to Roosevelt Park, which is diagonal to the building, and wait there until we're told that it's safe to return.

Today's Workshop is being broadcast through our WebEx conferencing system and parties do need to be aware that you are being recorded. We'll make an audio recording available on our website in about a week and a written transcript will be available on the website in about two weeks.

We'll have three opportunities for public

comment today. One before lunch, one after our second panel in the afternoon and one at the end of the day. During the comment periods, we'll take comments first from those of you in the room followed by those participating by WebEx and finally those who are phone in only. For those of you in the room, when you're making comments or asking questions please come up to the podium in the center of the room and use the microphone so that the people on WebEx can hear you. It's also helpful if you can give our Court Reporter a business card when you come up to speak so that we can make sure that your name and affiliation are reflected correctly in the transcript. For WebEx participants you can use either the chat or raise hand functions to let our coordinator know that you'd like to comment or have a question and we'll either relay your comment or open your line at the appropriate time.

We're also accepting written comments until close of business on June 13. And the Notice for today's Workshop, which is available on the table in the foyer and also posted on our website, describes the process for submitting comments to the IEPR Docket.

So, with that, I'll turn it over to the Chair for opening remarks.

CHAIRMAN WEISENMILLER: Thank you for your participation today. This is one of our series of

Workshops on this IEPR following up on last year's IEPR to look at very specific topics in the area of renewables. In particular today, we're looking at two things. One is the wall of research and development to basically resolve issues and move renewables forward and also to touch base on where we are on some of the ARRA projects and finally look at financing.

Jim, any comments?

MR. BARTRIDGE: Good morning. Commissioner Peterman can't attend as of this moment. She'll join us later but sends her regards and welcomes you all. Thank you for participating in today's Workshop.

MS. KOROSEC: Thank you. All right. Every two years the Energy Commission prepares an Integrated Energy Policy Report, or IEPR, that covers a variety of energy topics and provides policy recommendations to the Governor with an update prepared in the off years.

In 2010 Governor Brown directed the Energy Commission to prepare a plan to expedite the permitting of priority renewable generation and transmission projects. To provide the foundation for that plan, the Energy Commission developed the Renewable Power in California Status and Issues Report as part of the 2011 IEPR, which described the status of renewable development in California, challenges to future renewable development and

efforts to address those challenges. The report also established five high-level strategies as the basis for a more comprehensive, renewable strategic plan that's being developed under the 2012 IEPR Update Proceeding.

Today's Workshop is the sixth of seven Workshops on topics related to those five strategies. And the discussions and input from the Workshops will be used to develop specific near term actions that the State needs to take to begin addressing some of the challenges that were identified in the Renewable Report.

The fifth strategy that was identified in the Renewable Report is to ensure adequate financing and incentives at critical stages of renewable development and to maximize the use of federal stimulus funding by prioritizing development of renewable that are vying for those funds.

Our agenda today begins with a panel looking at Emerging Renewable Technologies that are either not commercially available or at a very early stage of commercialization but that could still contribute to the 33 percent renewable portfolio standard. The panel will be followed by an opportunity for public comment and then we'll break for lunch around 11:30. Our second panel after lunch will discuss the current status of project finance, creative ways to provide financing and capital

and potential strategies to respond to the expiration of federal investment support mechanisms like treasury cash grants and loan guarantees.

We'll then have another opportunity for Public Comment followed by a short break mid-afternoon and then move to our final panel on the status projects that receive funding through the American Recovery and Reinvestment Act and discuss the barriers they may be facing and what activities are needed to facilitate development of large scale renewable projects. After the final panel we'll finish with a presentation on a research project that was done by a group of Executive Fellows on barriers associated with distributed generation development. We'll then have one final opportunity for Public Comment and we hope to adjourn around five o'clock.

Before we get into our panels, I'll provide brief background information on today's topics that was presented in the Renewable Status and Issues Report. The Report covered challenges associated with investment and financing at various stages of renewable development and also provided an overview of research development and demonstration projects that have been funded by the Energy Commission's Public Interest Energy Research Program that support renewables in California.

This figure from the Renewable Report shows the

five stages in the successful development of renewable technology and sources of financing at each stage, with the primary financing gaps occurring at the research and development and commercial stages of project development. The R&D phase generates ideas, tests intellectual property and, given high failure rates, is a high risk stage for potential investors. That's followed by the demonstration and proof of concept stage, which builds the company, designs and tests prototypes and demonstrates the feasibility of an idea or technology. At the pilot stage, the technology moves from the lab to the field where data and results are quantified to improve the prototype and to provide technical information to investors.

Next, the early commercial phase allows companies to demonstrate the viability of its technology at scale. And, finally, commercial maturity is widespread adoption of the technology.

For the financing gap for R&D, the Report noted that in the U.S., although overall R&D has grown annually by six percent, in 2010 investment in energy-related R&D was about $1 billion less than a decade ago. In 2010, the International Energy Agency estimated that globally solar and wind technologies face an R&D shortfall of between $2 and $6 billion. The private sector's share of energy R&D investment has also declined from nearly half the 1980's

and ‘90s to around 24 percent today, with total private sector energy R&D actually less than the R&D budgets of a few large biotech companies.

One reason for this underinvestment is that private companies tend not to invest in the level of R&D that’s most beneficial to society because they can’t monetize all the public benefits and spillovers of their R&D. For clean energy technologies, there’s often underinvestments because the non-energy benefits of those technologies haven’t been adequately valued in the market. Plus, because renewable technologies are relatively new compared to fossil fuel technologies investors may require a larger return to address the uncertainties about the potential of the technology.

On the positive side, venture capital investments continue to increase, with national investments in cleantech companies in 2010 at nearly $4 billion and investments of more than $1 billion in the first quarter of 2011 alone.

California accounts for more than half of national venture capital investments. Partly due to the number of venture hubs in the state like Silicon Valley in the north and San Diego in the south and partly due to California’s policy and business environment being so supportive of innovative technologies. Given the

underinvestment in the private sector – or by the private sector, excuse me – everyone plays a pivotal role in funding R&D. The federal government is a primary source of funding basic research across all sectors with the second largest source being academic institutions. California funds research primarily through state and private universities and through the Public Interest Energy Research Program.

The second funding gap is at the early commercial stage, which is defined as one of the first 3-5 deployments at a scale that generates revenue and is consistent with the company's long-term rollout plan.

Significant capital is needed at this stage to demonstrate the viability of a technology at scale and to prove that manufacturing or power generation can be done economically. At the early commercial stage firms have traditionally used private equity, debt and tax equity markets to provide financing. But since the financial crisis these options are either impractical, given the economic conditions. They depend on government incentives to function well or they don't provide sufficient returns for investors.

Other things like power purchase agreements, feed-in tariffs and the availability of incentives can affect the financing the renewable projects. The power

purchase agreements provide greater certainty for project revenues and are critical in addressing the early commercial financing gaps, especially for large commercial projects. Feed-in tariffs provide a guaranteed payment for electricity and a stable long-term contract, and the predictability of feed-in tariffs attracts investors. Globally, this is the most widely implemented policy for accelerating renewables and, in fact, it accounts for a greater share of renewable development than either tax incentives or RPS policies.

California has also used financial incentives to promote development of renewables, particularly distributed generation, including the California Solar Initiative, the Emerging Renewables Program, the new Solar Homes Partnership, the Self-Generation and Incentive Program and energy metered.

Efforts to address financing challenges for utility scale renewable development include, on the research side, investments at the national level by government laboratories at the Department of Energy and at the state level by state and private universities and the Public Interest Energy Research Program. The UC System received more than $4 billion in total research funding in the fiscal year 2009-2010 and has produced more patents than any other university in the nation. The university

system also contributes to technology transfer and to the overall development of the state's expertise in renewable generation technologies.

The Energy Commission's PIER program has provided roughly $170 million in R&D funding for a variety of activities that are in support of California's renewable goals, including mitigating environmental impacts, enhancing transmission distribution grid reliability, promoting renewable integration and improving renewable technology performance and costs. About 10 percent of that funding has been for basic research, about 30 percent for technology development and more than half the technology demonstrations. PIER has also provided seed funding for technology incubators and cost-share for workforce development activities for renewables, and was also instrumental in leveraging more than $500 million in federal stimulus funding and $900 in private investment funding using only $20 million in program funds.

The Renewable Report discussed the expiration of the funding authorization for the PIER Program at the end of 2011 and the uncertainty that was created by that expiration. At about the time that the Renewable Report was released in December 2011, the PUC had created the Electric Program Investment Charge, or EPIC, to continue funding for the expiring Funding Goods Charge through

2020. The PUC's May 2012 decision on the EPIC funds established funding of $162 million annually, which will be administered 80 percent by the Energy Commission for — excuse me, for R&D and for market facilitation and 20 percent by the utilities for technology demonstration and appointment. All funds are administered under the authority of the CPUC who will hold a proceeding every three years to consider detailed investment plans presented by the administrators.

Other strategies include targeted programs to help offset the high initial capital costs of renewables including tax incentives or subsidies including the Federal Business Energy Investment Tax Credit and the Renewable Electricity Tax Credit. Under the American Recovery and Reinvestment Act, the ITC could be converted to a cash grant to offset as much as 30 percent of project cost. As of October 2010, more than 300 California projects had been awarded more than $490 million in cash grants.

The PTC provides incentives for electricity generation and a U.S. Energy Information Administration analysis in 2005 indicated that if the PTC were extended through 2015 it would increase installed wind capacity by 580 percent, biomass by 65 percent and geothermal by 20 percent. However, the PTC for wind is slated to expire in

2012. In fact at our Workshop last week on jobs and economic development a panelist from the wind industry mentioned that in recognition of the climate in Washington D.C. for the first time the American Wind Energy Association has introduced the concept of a PTC that declines over time, although it's unclear how much traction that proposal is going to get.

There's also accelerated depreciation to help provide capital at the front end of a project but the expiration date for 100 percent bonus depreciation was December 31 of this year – excuse me, last year and the expiration date for the 50 percent depreciation is December 31 of this year.

The Department of Energy's Loan Guarantee Programs have also supported clean energy technologies by underwriting loans to protect investors from the risk of default. At the time the Renewable Report was published, nine California companies had taken advantage of the Loan Guarantee Program, which ended in September of 2011, for a total value of more than $11 billion.

Also at least week's Workshop, one of the Panelists referenced a recent Brookings Institute Report that shows a 75 percent decline in federal cleantech spending from a high in 2009 to projected levels in 2014 if there's no Congressional action to continue federal tax

credits, grants and loan guarantees, which suggests that we'll need to start looking at different sources of capital that don't rely on federal support.

Bonds can also be used to finance projects. As of the date when the Renewables Report was released, California has issued about $640 million through the Federal Clean and Renewable Energy Bonds Program and $381 million through the Federal Qualified Energy Conservation Bonds Program. There are also state and local entities that issue bonds, including the California Alternative Energy and Advanced Transportation Financing Authority, the California Alternative Energy and Advanced Transportation Financing Authority, the California Infrastructure and Economic Development Bank and local municipalities.

One of the participants in last week's Workshop stated that, "If you put a dollar value to the PTC and the ITC in 2011 it was about $7 billion but if you look at municipal bond financing, just in the first three months of 2012, there was $80 billion available nationwide." So there's a need for the renewable industry to figure out how to take advantage of these funding sources.

On the DG side, efforts to address financing challenges include leases, in which an outside company rents the DG system to a customer and takes care of the

maintenance with monthly payments less than or equal to the energy savings. Power purchase agreements where the consumer purchases the electricity generated by the system from the company rather than renting the equipment even though the DG system may be located on the customer's property; the property assessed clean energy, or PACE Program, which was halted in the residential sector in July 2010 because of changes in lending policies for federally backed mortgages. However, the Renewable Report notes that commercial PACE programs are active in Placer and Sonoma counties and in Berkeley, Fresno, Los Angeles and the Palm Desert. And though this is a relatively new concept and not yet proven feasible, property tax assessments by the city or county can provide funding for property owners to install DG systems with the initial investment financed through bonds or from the general fund and paid back through a property tax.

And, finally, though not yet widely implemented on-bill financing programs have the opportunity to increase access to affordable capital for the installation of renewable energy systems.

So that's a very brief overview of the information that was in the Renewable Status and Issues Report that relates to today's topics. Before we move on, I just want to mention two comments that were made at last

week's Workshop that relate to today.

First, it's important to remember that the renewable industry is a relatively immature industry, relatively 20 years or so, and it's up against the fossil fuel industry that's been around for 120 years. Our challenge is to figure out how to turn this industry into a serious economic development opportunity and to make investing in renewables as commonplace as investing in other infrastructure like roads or schools or bridges so there's no question as to how to get financing.

Second, the state that figures out how to develop policies to finance new technologies and bridge the Valley of Death will gain a huge competitive advantage and significant financial benefits.

So on that note, let's move to our first panel on renewable technologies on the horizon and what needs to happen to advance their development and deployment.

Our moderator is Rizaldo Aldas from the Energy Commission's PIER Program. Rizaldo? And if our panelists could come up to the table, please.

MR. ALDAS: Good morning. And, thank you, Suzanne. We are slightly ahead of our schedule. We'll go ahead.

My name is Rizaldo Aldas. I am the current lead for Renewable Energy and Advanced Generation, Research and

Development with the Energy Research and Development Division here at the Energy Commission.

Welcome. This is the first panel of the day. It's on Renewable Technologies on the Horizon. This panel will explore emerging and cutting edge renewable energy technologies that are not currently commercially available or are at the very early stage of commercialization but to have the potential to achieve the 33 percent renewable for renewable portfolio standard. A more diverse technology portfolio provides a hedge against future known technology market and regulatory changes to put the state in a stronger position to meet its goals.

The goal of this panel is to identify such technologies and recommend next steps to advance development. There are a number of questions that need to be addressed to move these advanced technologies and some of these questions are shown on the screen. They are: what are the roles of these technologies, what is the time horizon for commercial development and what is the current level of commercialization, what are the technology cost projections and what financing strategies and government support are currently available for these technologies and are these strategies effective or what other policies and incentives are needed to advance the commercialization of these technologies?

I think the bottom line is what will it take to commercialize these technologies and what are their roles for meeting the RPS goals?

We have here a distinguished panel of experts who will help us address those questions, and thank you so much for accepting our invitation to be here. Some of the discussion will focus on specific technology while others will address the overall technology and policy picture of clean renewable energy technologies. And, in addition to the panel discussion, I will also encourage our public participant stakeholders to also let us know your thoughts and provide us with your comments about this topic.

The panel is going to be kicked off by a presentation by Lew Milford but I think he's not here yet so we will just go ahead and proceed with remarks from our panel of experts. And when Lew is here we'll do his presentation. I'm asking our panelists to limit their remarks to 5 minutes so that we will have a lot of time later on for discussion. So, with that, I will start with George. By the way I will not introduce – I will not make a lot of introductions and I will ask you to mention a little bit about yourself for our audience. Thank you.

MR. SIMONS: Good morning, Commissioner. Good morning. So – thank you, very much. So I'm going to be talking about solar RD&D, some of the opportunities and

some of the challenges facing RD&R.

Suzanne mentioned earlier about getting to the point where there's an investment that's equal to renewables as far as fossil. At a global stage we're already there. Most people don't recognize that the investment in renewable energy in the private sector has now begun to equal that invested in fossil.

In 2010, there was over $210 billion invested in renewables and about $80 billion in the solar arena. And one of the interesting things about that investment in 2010 is if you look at this chart, and I apologize. It's somewhat hard to see the figures. But a vast number of that investment was on smaller solar capacities, distributed solar. And so the prospects for continued solar investment and solar growth is tremendous.

If we look at the European community and worldwide, they're anticipating that we're going to see more than a doubling in capacity by 2017. And DOE, who has brought together a number of experts in this arena, expects we're going to see a tenfold increase in PV by 2030. Of course, they also expect a significant increase in concentrated solar at the utility scale. And the PV increases here are both the utility and customer side.

Well, in order to get to that level of penetration, that kind of growth, of course there's going

to have to be some reductions in costs. Again, if you look at the past 30 years of what's happened with the cost of solar technologies, they've dropped pretty steadily. I mean there's been some ups and downs due to some market conditions and we're seeing some surplus capacity right now but overall the trend has been downward. And we've seen that even since 1998 prices have dropped almost in half and DOE continues to expect that price drop to occur and they're focusing the SunShot Initiative to try to get a fourfold decrease in cost. And so what we're talking about is if you look at some of the utility scale applications in California that are going in right now, we're seeing PV costs down below the $4/watt right now that DOE considers a reference case. We're seeing things like $3-$3.50/watt. And, again, some of that will translate over because the manufacturing types of techniques over to the customer side. Particularly, we now have customers that need something like a megawatt or two megawatts on the rooftop.

So one of the questions that's asked is what kind of role will renewables be playing in the future. And because of the ubiquitous of solar in the marketplace now we're expecting to see quite a variety of rules that as we get expansion of solar, and particularly PV into the marketplace. First off, there are 29 now, I think it's

more than 29 states, that have RPS goals and solar plays a pivotal role in state's meeting their RPS goals. Within California 50 percent of the RPS goals are going to be perhaps contributing to the 33 target for 2020. And as we expand out beyond the 33 percent goal we expect solar to play a huge role.

Solar's also going to play a role in getting to reduced greenhouse gas emissions, both in terms of solar electric as well as some of the hybrid technologies. And I'll talk about that in a second - that not only produce electricity but also back off processing facilities.

And, lastly, we're seeing a growth in electric and plug-in hybrid electric vehicles. We expect the number of vehicles on the road right now, a little less than 100,000, to be up nearly to a quarter of a billion vehicles by the end of 2016 and solar is going to provide a way to enable sustainable charging of those systems.

So as we start to think about the role that these R&D technologies face in the future and what we need to do to improve these technologies, ITRON manages the California Solar Initiative RD&D Program, and one of the things we focused on is what's going to happen, what has to happen, with solar technologies as they begin to get more integrated into the electricity grid.

We're now seeing that PV facilities on the

customer side are going to be exceeding 15 percent of the penetration of peak loading on distribution feeders. It poses huge questions on how do you not allow export. How do you enable — how does PV going to enable a reliable grid? And so you're going to have to begin looking at things like better communication systems between PV inverters and meters and how does that two way communication work. States made a tremendous investment in smart metering technology and that should be coupled with these systems so that you can, in fact, enable that two way communication.

We have to begin looking at — solar's not just a standalone technology but, again, how does that integrate in. So some of the other things that you'd be looking at is how do you begin to look at optimal locations for locating PV? How do you have resource type models that help utilities understand the temporal and special nature where the resources and how to tap into it? And some of these are very refined models.

And you also have to look at how you're going to integrate in solar technologies with other tools that customer's need. There's going to be increased amounts of energy efficiency in the future and demand response. And so you have to begin to look at how to couple solar technologies with those other types of tools that are

available to customers.

And with that I am happy to wrap up and let's move on to the next speaker. Thank you.

MR. ALDAS: Let's move on to the next speaker. Our next panelist is Bill Glassley. Thank you.

MR. GLASSLEY: Thank you and I want to thank you for the opportunity to present on geothermal at this meeting. My name is Bill Glassley. I'm the Director of the California Geothermal Energy Collaborative.

What I would like to do is talk about two aspects of geothermal that I think are relevant to the topic at hand. One relates to the use of geothermal energy as a heat source and using heat directly; a technology that could be significant for the state meeting its goals. And the other is power generation. I'll first deal with the issue of heat as a resource for providing HVAC services.

Geothermal heat pumps have been around for a number of years. It's not new technology but its use for the state of California in the sense that it's penetration in the marketplace is very minimal.

One of the reasons that's been the case is that geothermal heat pumps have been considered to be inappropriate for the state of California by a number of people simply because the climate in California is

relatively mild. The state of California consists of 16 climate zones and we were skeptical of the argument that geothermal heat pumps really were not appropriate for this state.

So with support from the California Energy Commission we undertook a study of the 16 climate zones modeling the use of geothermal heat pumps using standard commercial software that's normally used for developing designs for these systems.

What you see in this graph, excuse me, is a summary of the results of that work. The vertical access represents that amount of energy in kilowatt hours per year that would be used to heat a model home, using conventional HVAC systems, the horizontal access is the amount of energy that would be used using geothermal heat pump systems and anything that falls above the heavily dashed line represents conditions in which energy is saved if a geothermal heat pump system is used.

As you can see from the graph in 15 of the 16 climate zones there's significant energy savings. In fact, on average for HVAC purposes, 44 percent energy would be saved if geothermal heat pump penetration were significant in the state. And, in fact, for that one point that falls slightly off of the, essentially zero return, that point would fall up above the curve, the zero

return curve, if new technologies that use advanced method for heat transfer were used.

So, in essence, what we are saying is that geothermal heat pump systems could provide a substantial energy savings for the state of California and as a result, although such applications do not directly contribute to meeting RPS goals by diminishing energy demand they increase the ability of the state to meet its RPS standards.

The biggest difficulty in accomplishing significant deployment for these systems in the state is the upfront cost. The challenge of financing these systems is difficult. And one of the things that needs to be done is develop methods for providing incentives for displacing the initial cost. A number of things have been proposed: financing opportunities and options, tax incentives for homeowners or commercial development. Applications such as those could have a significant impact in deploying these systems in the marketplace.

With respect to power generation, I want to talk about three technologies that are in the process of being developed and could have a dramatic impact on the state being able to meet its RPS goals. Geothermal currently provides a substantial contribution to the overall renewable energy portfolio the state currently has.

Depending on the day and time – the time of day and day of year, geothermal is providing anywhere from between 20 and 40 percent of the renewable energy the state is using.

Three technologies are currently being developed that could dramatically enhance that. One is a hybrid geothermal solar applications, whether it's solar thermal or solar PV, doesn't matter but the concept is that a geothermal plant would be co-located with high intensity solar resources. There are a number of places in the state where that's possible. Even in Los Angeles basin is such a location.

Such hybrid systems improve the efficiency of the overall combined technologies. They have seasonal responsiveness that is difficult to achieve otherwise. Therming capacity has improved. They make much better, more efficient use of transmission lines that either currently exist or are planned. And, in general, they would greatly diminish land use footprint. Those are some of the advantages of such systems.

Another technology that could be developed using geothermal power production capability relates to distributed generation. Many communities around the state have co-located geothermal resources with solar, wind and/or biomass. The problem that most of these communities have, however, is that they simply don't have

the expertise to optimize their application or development of distributed generation.

One of the things that could be done or should be done is to provide the capability for these communities to have – to optimize their use of their local resources.

Finally, enhanced geothermal systems. Enhanced geothermal systems represent situations in which geothermal resources exist at depth but there's either inadequate permeability or inadequate fluid to allow generation to occur. However, major advances – the state of California has huge resources with respect to geothermal. U.S. Geological survey estimates that somewhere between 32 gigawatts and 67 gigawatts are available in this state to enhance geothermal.

Major advances have occurred in developing this technology, particularly in improving fluid flow and permeability but they're at the very, very early stages of development.

Three things could be done to improve their penetration and development of these technologies in the marketplace. One is improving the efficiency of the permitting process in the state of California. One of the largest upfront costs that a project development faces for geothermal, but I think it's also true for many renewable energy resources, is the complex permitting process. For

a geothermal power plant it could take anywhere from 2-3 years, and that isn't necessary. It could be much more efficient not to say it could be easy but there are ways in which it could improve.

Second. Power purchase agreements that are currently put in place, BPAs, tend to follow a certain pattern and they tend to be relatively rigid in their form. Flexibility in how those are developed and structured could make a big in the ability to bring these systems online in a cost-effective way.

And, finally, developing incentives that encourage the use and development of hybrid or combined technologies, I think, would have a dramatic impact on the ability to develop both distributed generation but also larger scale geothermal development.

Thanks.

CHAIRMAN WEISENMILLER: A couple of questions. First, the heap up numbers are interesting, but could you provide a table of the assumed usage per house and compare that to our recent Title 24. The numbers look pretty high, frankly.

MR. GLASSLEY: Absolutely.

CHAIRMAN WEISENMILLER: Another thing is on the siting, frankly part of it is to encourage the geothermal industry to apply to the Energy Commission, not to local

governments. We do things in a year.

MR. GLASSLEY: I understand that. The reality is though that there are also local issues that have to be addressed every time somebody tries to permit something.

CHAIRMAN WEISENMILLER: Right. And we do that in our process. Most of the geothermal projects, as you know, are 49 megawatts so they should learn that lesson.

MR. GRASSLEY: Okay.

CHAIRMAN WEISENMILLER: Bottom line. You're at the Energy Commission and we did cite over 4 gigawatts for the ARRA projects, not in geothermal.

MR. GLASSLEY: That's right. One of the—

CHAIRMAN WEISENMILLER: And some of them in nine months.

MR. GLASSLEY: The issue with geothermal that I think the state could address that would make a big difference is that in addition to the Energy Commission requirements to applications and permitting, there's also a number of local issues that come up with drilling, road development and things that are independent of what the Energy Commission looks at and those issues are part of the reason that the permitting process for geothermal plants ends up being on the order of a couple of years.

CHAIRMAN WEISENMILLER: Right. Okay. Thanks.

MR. GLASSLEY: Thank you.

MR. ALDAS: Thank you. And next we will have Jack Brouwer.

MR. BROUWER: Hello. My name is Jack Brouwer. I'm the Associate Director of the National Fuel Cell Research Center and a Professor at the University of California – Irvine. I'm here to talk to you today about the critical roles that fuel cells could play in a sustainable and renewable future.

I believe fuel cells have a bunch of critical roles that they could play. Some of which are described on this slide.

They first offer one of the only technologies that offer all of these features: very low to ultra low criteria pollutant emission, high fuel to electricity fuel conversancy and those features offered at the distributed scale.

They also offer opportunities, of course, for combined cooling, heating and power but also the poly generation of fuels, such as hydrogen.

Fuel cells can produce continuous power and also could be dispatched in a way that could complement the otherwise intermittent renewable power and that can be achieved regardless of whether they operate on renewable fuels.

It is the only distributed technology that has

these features and has efficiencies that are comparable to or even greater than natural gas combined cycle plants and has the emissions that are sufficient for siting everywhere in the state, regardless of non-attainment areas.

Fuel cell vehicles could also contribute by using renewable produced fuels that can come from tri-generation or poly-generation plants.

And, finally, an emerging technology that can use hydrogen as energy storage is a nice option that could be considered for storing otherwise curtailable wind power.

I'd like to success already demonstrated success in a lot of these areas exists throughout the state. So, for example, biogas operation of fuel cells is being achieved throughout the state. For example, Tulare's Water District is shown here. Biogas use in the tri generation of power heat and hydrogen is already being accomplished in Fountain Valley, California. Combined cooling, heating and power is being accomplished throughout the state. At UCI we're looking at the complimentary dispatch of fuel cells so that they might be able to complement the intermittency of wind and solar.

There's dispatchable green power that's already being put onto the grid even that being used – that uses

natural gas. There are communities that I believe that can contribute very significantly to the increased penetration and use of renewable power if they are well integrated and controlled. And there's research that suggests that these renewable energy sustainable communities will do a very significant job in the future.

And then in these transportation applications where they can be used also for charging plug-in, hybrid and battery electric vehicles but also providing renewable fuels to fuel cell vehicles and the emerging idea of energy storage, where hydrogen production could be made from otherwise curtailed renewable resources.

Thank you for your attention.

MR. ALDAS: Thank you, Jack. We now listen to Mirko's remarks.

MR. PREVISIC: Thank you for having me. My name is Mirko Previsic. I'm with RE Vision Consulting. We're a small outfit that's focusing on green renewables.

I've been involved in this field since about '96 and I think that the theme over the last few years is that we seem to get at the real issues that are involved in offshore renewables and they largely deal with the challenges that are involved with getting technologies out in the ocean. What you see out there on this screen on the left side – on the right side is a high wind turbine,

2.3 megawatt deep water turbine that's been deployed since 2009. On the right top side that's the Pelamis Machine. This was first deployed in 2005 and since then there's been about 5 installations. The power technology's power boy at the bottom left side has been in the water for a few years as well.

There's sort of an accumulating basis for deployments. I want to talk briefly about the research potential. Offshore wind, especially in California, the issue with offshore wind is that traditionally it requires very shallow water and in the early deployments in Europe with Horn's Ref and some of the projects, they go into water depths of maybe 30 feet. And so the challenge with California is that we have a very rapidly dropping coastline and that pushes us to different types of technologies, really, if we wanted to look at the — tapping into the larger potential. And sort of the technology pathways there, I think in terms of deepwater technologies today, there's about three different machines deployed today that are operational. There's another five or so that are in the pipeline of being developed. The total resource potential, this chart actually comes from the National Renewable Energy Lab in Boulder. But if you look at the deployable potential as a function of water depth, you know the 0-30 meter water depth in light blue

here is 4.8 gigawatts but then as you go into 60-900 meter water depth line you're looking at about 200 gigawatts and you're much further from shore so visual impacts are smaller. So it's important that we push the technology toward that sort of technology envelope.

I want to touch briefly on wave energy and the two are pretty related, both in terms of costs where they stand today as well as technology maturity.

California has extremely long coastlines, about 1,200 kilometers. And we did a brief assessment – the numbers that I put up here are from quite a while back. We're actually just now in the process of releasing another report for the U.S. Department of Energy but in California the available power, the average available power, hitting California coastlines are in the order or 36,000 megawatts. Extractable of that is about 5,400. So it provides a significant resource potential.

In terms of the cost, and I think this is true for many technologies, this is true for offshore wind as well as wave. We've sort of have been testing a pilot phase, technology cost is high just because it's early stage technology, single unit deployment. Those sort of issues. Probably on the order of $0.40-0.70 / kilowatt hour. If you actually look at the commercial opening cost, so no technology improvements, but you're pushing

these plants to larger scales that are on the order of 50 megawatts, just the effects of pushing that to scale brings you down to a range of about, we recently assessed wave and we came in at $0.26 / kilowatt hour for the first commercial deployments. Wind today is on the order of maybe $0.20 plus, $0.22 a kilowatt hour, for the early commercial stuff.

But if we really invested a little bit into R&D there's a huge potential to drive down the costs much more rapidly and you can sort of see in the national context this chart shows the commercial opening cost at about $0.26 and there's sort of an uncertainty bound around that but the cost of electricity targets in Hawaii it's on the order of maybe $0.14. The lower 48 it's quite a bit lower, 6-7. California probably a little bit higher, probably on the order of $0.10 a kilowatt hour is your target which would be reasonable. But we could be there pretty quickly if we focused on R&D.

Now in terms of the sort of needs of this technology space what we need are experiment playgrounds where we can text the technology, look at the environmental effects, look at the whole lifecycle implications of actually operating such a plant for a few years and drive down costs.

And I want to just sort of – actually, before I

do that, in terms of learning rates and what other industries have seen we know today that costs are pretty high for marine renewables but that's something that's very normal for an early adopter industry. We've seen this with photovoltaics. We've seen this with wind mills. We've seen this with natural gas turbines. And typically we see for every doubling of capacity, we see a certain percentage in reduction of costs, and that's been sort of demonstrated over the year.

So it's not surprising that technologies today are expensive but I think it's pretty reasonable to expect that these costs will reduce pretty rapidly, especially in the early stages of industry development.

A few more points I want to make and that is there are several programs in place. The U.S. Department of Energy has programs in both hydrokinetic, which includes wave tidal, ocean currents as well as offshore wind. They're about to establish a test site in Hawaii, in collaboration with the U.S. Navy. There's also on the offshore wind side the recently just closed solicitation, $180 million investment into, I think, it's between 5-6 demonstration plants around the country to demonstrate offshore wind in different regions around the country.

So there's sort of a strategic interest in the U.S., probably more importantly the U.K. in driving this

space and has had an R&D program in place for the last decade or so and made significant progress over those times. So we've seen a lot of good results coming out of that.

In terms of wave power and what's been deployed on the wave power side, just a few examples of some of the commercial devices in the water. Pelamis deployed about 4 devices about now. It's started in about 2004 they're now deploying their generation two machines, 750 kilowatts installed. Ocean Links in Port Kembla. They deployed their first unit in 2005. That's a 500 k/w Unit. Ocean Power Technologies deployed between 4-5 units. They're at about 150 kilowatt rated and they deployed in Hawaii, UK, Oregon. Oysters deployed at EMEC in 2009, their first unit, 500 k/w machine. They're now deploying their second generation device at 2.1 megawatt and there's probably not a 4 or 5 technologies. There's sort of prototype development, or maybe a little bit more early staged, than commercial development. But the point being is that the technologies are moving towards a state of commercial readiness where they would be ready to be, you know, used in a demonstration type scheme.

That's all I had. Thank you.

CHAIRMAN WEISENMILLER: Okay. Thank you.

A couple of questions. I mean, one of them is,

what would you give as a realistic timeline for the development of the ocean technology in terms of where, and realizing that we have different technologies, word is now where to get it to that sort of R&D demo stage and where do you potentially get to the competitive commercially available stage?

MR. PREVISIC: In terms of from now to, say a demonstration stage, I think there is sufficient number of technologies out there to actually demonstrate and starting today, really, in the California type of environment. And that sort of would allow you to really gain experience on the environmental effects and some of the social impacts and gaining public acceptance, etc.

The commercial timeline is a little bit more difficult and, as you may imagine, it's very much dependent on what kind of funding we're going to see over the coming few years. I would think that offshore wind might be a little bit closer than say wave technology just because there's a huge amount of leverage that can happen with onshore wind, which translates directly to offshore wind. But the DOE sort of has horizons on the order of 10 years to get the commercial readiness but, of course, the question becomes what is – at which point do you define a technology commercially ready, right? So I think it's a difficult question to answer.

CHAIRMAN WEISENMILLER: Yeah. I think the other question is certainly one of the things – I was going to say obviously all of us have been looking at fusion for probably the last 30 years and having it be 50 years out. So trying to understand what the timeline is here. And it does take awhile for technology to get to maturity, particularly depending on the competitive space.

MR. PREVISIC: Yeah.

CHAIRMAN WEISENMILLER: But one of the issues that we're running into with wind is interference with some of the military operations and so I'm trying to understand how much we should worry about that in the context of offshore wind for California.

Obviously, it's an impact on onshore wind.

MR. PREVISIC: Yeah. We haven't really seen that issue come up as an issue. We've been working with the U.S. Navy quite a bit and they're big supporters of moving this technology forward because it can provide some of their power needs in some of their remote locations. Maybe offshore wind, you know, just because of tower heights and those sort of things have more of a signature in terms of impacts than say wave technology. But it's not really been an issue that's been raised much, so far, at least with that.

CHAIRMAN WEISENMILLER: Well, again, in the U.S.

– and the Navy spent a lot of time at the Secretary's level trying to deal with the issue and making sure – not blanket statements about it but certainly there are areas where they are drawing pretty tight lines saying no wind in those areas. But, again, you know, you can point to wind operating near military bases which have a lot of stealth technology and other technology so it's not a total stop but, you know, there are certain areas that are having impacts in limiting their use.

MR. PREVISIC: And I think a lot of the technology space is a little bit too early in development that we really see – that we're even starting to think about these large scale deployment issues. That could happen in, say, 20 years from now.

CHAIRMAN WEISENMILLER: Yeah. Although some of it is obviously good to get out in front of. It would – Certainly in the '80s we put a lot of wind machines into Altamont and, obviously, it would have been good if we had been thinking about the migratory bird patterns at that stage than we were.

MR. PREVISIC: There's certainly room for well thought out research programs that tackle these issues. I would certain agree with that.

CHAIRMAN WEISENMILLER: Okay. Thank you.

MR. PREVISIC: Thank you.

MR. ALDAS: Thank you, Mirko. Our next panelist is Lon House.

MR. HOUSE: Good morning. I'm going to talk about current unused small hydro locations in California. This top corner right here is pressure reduction valves. Remember any time water falls it gains pressure. For each foot of elevation that you drop you gain about half a pound of pressure so if you have, and you have to keep the pipelines within certain pressure parameters otherwise you start blowing your joints out, so basically any place that has more than 100 foot elevation you're going to have a pressure reduction valve. And this is a facility in San Gabriel Valley in which a small hydro electric turbine is going to be put in as a bypass to a pressure reduction valve.

There's irrigation drops. There's tens of thousands of these pressure reduction valves throughout the state. There's irrigation drops throughout the central valley. There's thousands and thousands of them. And then, the last one, is non powered dams. These are either dams that were initially not powered or in this particular area, this is Cache Creek, and this hydro electric generator is not operated since the late 1990s.

I just am showing some new, small hydro technologies. The one on the top left here is called the

hydro engine. It is specifically set up to deal with irrigation drops. The interesting thing about it is it's only looking at under 20 foot a head. So it is a very interesting technology. The pump is turbine and basically this is what most of the pressure reduction installations are. You're basically taking a pump and running it backwards. Instead of having electricity come in, running through the motor and running your impellers and producing water and pressure out there. You run it backwards. You have to change the impellers a little bit and you have to have some new electronics equipment in there but that's the most cost-effective one that is available out there right now.

The last one is something that's another new project and there's a demonstration project out there in the City of Riverside and this is basically a darious machine that fits in a big water pipeline. And this — these will go into the big, sort of backbone transmission pipelines, 6 feet or 60 inches or above. The neat thing about this is it only breaks about 10 pounds of pressure when it runs this generator and so you can put them in without compromising the flow in your particular line.

I put this up as one of the questions. This is actually the project in San Gabriel Valley. To just to show you that hydro is quite a bit different than the

other entities. This is after the water agencies decide they want to build this project. How long it takes to get through the process. The big chunk here in the middle that none of the other technologies face is a FERC license. What you can do with hydro is you can get an in conduit exemption but you still have to do the full consultation for a hydro facility, which means you have to notify everybody, you have to have public meetings, you have to do the full environmental documentation and that takes between 6-9 months for any size hydro electric facility that you're putting in. And, as you saw on the previous slide, you're doing these in many cases on potable water systems, so there's mothering left alive in that water and they're often in the middle of the street. So the question is do we — and there's some legislation that I'm going to talk about in just a second. So I went ahead and answered all of your questions, at least part of them. So you can ask me anything, Bob.

The small hydro overview — the mantra has been because hydro — the energy that's available is pressure times flow. The way that hydro has been developed in the past has always been custom turbines because the machine that you need is uniquely depending on your particular hydro, your particular flow and your particular pressure regime. That works for large, in my world, large 1

megawatt. It's not cost-effective for the small project, okay.

The California resource potential, and I just put these up, this has been testimony that the Energy Commission over the years. It's anywhere from over 250 to over 1,000 megawatts are commercially available. What the actual number is I'm not sure.

The development timeline is about two years. Remember 6-9 months of that is the FERC exemption project.

The hurdles – FERC conduit exemption I talked about. The interconnection costs that everybody else faces but we just run into another one in which this was a Rule 21 interconnection in Southern California and southern California Edison came back to us and said, "Stop. This is rotating machinery. You need a dedicated ground bank for this thing. Not – the wind and the solar guys don't have to have it. It's another $40,000, which destroys the economics of that project.

I think we have a workaround with that. There was some email that came back from Southern California Edison yesterday. I think we have a workaround with that. But this is just something else that other entities are just not necessarily having to face.

Distribution lines cost about $50-80 / linear foot. Particularly, and this destroys the economics of a

lot of the irrigation drops. Government programs I won't talk about.

Technology cost. The hydro — the small hydro facilities will generate electricity at about $0.06-$0.10 a kilowatt hour. This is full in. About $0.0025 of that is either regulatory or interconnection costs.

Commercialization. The pump is turbine is currently commercial. They are still customized for somewhat for the impellers and for the electronics. Some of the other new technologies that I showed there are not in commercial because they're awaiting orders to develop their production line.

And, in general, cites below 100 kilowatts which are distributed throughout the, particularly, the urban areas are not cost-effective. The interconnection costs will just kill you.

What can be done to enhance this technology? And I put down here two legislations. Federal legislations that will exempt in conduit hydro from the FERC exemption from hydro. It will cut 6-9 months off of the development timeline for these projects.

Because we're getting into areas with these pressure reduction valves that we haven't gotten into before we still do not have a standardized interconnection primes for small hydro.

The fifth – price – we've talked about.

Access to funds. I say most of the small hydro sites in California, I could probably say all of the small hydro sites in California that I'm talking about here, are owned by public entities, owned by water agencies. They are facing the similar situation to all of the other government entities in the state and they are really cash short or investment short. So if access to alternative financing mechanisms would greatly enhance the development of this particular process.

And then, the last one, I want to talk about is a standardized mass produced turbine. Generators are still not actualized. One of the things that I would really like to see is we have standardized pipes throughout the state. Right. You've got 8, 12, 18, 24 or 36, 48. So you know what size is going in. You also know what pressure those things are generally facing. Whoever comes up with a standardized mass produced technology that will fit in there, right? Because you're not facing anywhere from 150-300 pounds of pressure. You're facing a fixed amount of pressure. That has not yet been done. But when that occurs and it drops the installed cost of these projects, and these projects are generally about $1/watt when installed, that will make the economics of the interconnection and everything much different and will

greatly enhance this particular technology.

These technologies, as opposed to the other technologies, are actually energy efficiency improvements because that pressure's being developed in the system. Right now the pressure is either being burnt as heat or noise. And what this does, and this is one of the reasons it applies to the — under the self generation incentive program. It's called pressure reduction valves in the self generation incentive program but that's a unique thing about hydro electric that's been somewhat un — totally not completely successful of treating these as energy efficiency projects but because they're generating electricity then they get bounced into the generation part.

That's it.

CHAIRMAN WEISENMILLER: Thanks and, obviously, if these were going through project finance an issue for the turbines will be the types of guarantees one gets and that's probably also true for the bond financing. Just trying to understand on the innovative turbine designs you're showing upfront how many of those are actually financeable at this stage?

MR. HOUSE: They — one of the issues to what you're talking about is if you use SGIP money you have to have a 10 year warranty on them. The turbine

manufacturers won't – will generally not warranty it for that period of time but one of the things that's been worked out is that you can do an own-in operation maintenance thing with that. The other issue that can drive a lot of these turbine costs up is once you set it, you set it into a potable water system, you have a whole new – it has to be stainless steel. It has to be a lot of other parameters. That's one of the reasons that people – you're sort of driving them to pumpless turbines because the pumps are already certified to go into potable water systems. And they have the warranties that are long enough to do things. But it is an obstacle that these new, innovative technologies or hydro technologies are facing which are how long is the warranty and what kind of certification do you have to be able to put into a potable water system?

CHAIRMAN WEISENMILLER: Thanks.

MR. ALDAS: Thank you, Lon. Next panelist is Bryan.

MR. HANNEGAN: Good morning, Commissioners. Thanks for the invitation to speak to you today. It's also a great pleasure to follow the excellent panelists in front.

My name is Bryan Hannegan. I'm the Vice President for Environment and Renewable Energy at the

Electric Power Research Institute in Palo Alto, California.

EPRI, in case you may not be aware, is an independent, non-profit organization that's conducting research in the public interest on a variety of energy and environment topics, primarily designed towards moving us to a cleaner, more affordable and more reliable electricity supply.

This year of the $375 million in our annual budget about $25 million of that will go to renewable energy R&D, much of which will be focused on just precisely those gaps that Suzanne highlighted in her excellent opening and that my fellow panelists have highlighted this morning.

I want to step back and bit and see if I can't put a wrapper around all of the comments that have been made this morning.

In 2009 I was fortunate enough to lead, or co-lead with my colleagues Jane Long, Lawrence Livermore and Jeff Greenblatt at Lawrence-Berkeley Labs, a detailed study of California's energy future, conducted at the request of the California Council on Science and Technology.

We, in effect, looked at the state's economy, the population growth that we expected to see and was

projected by the state for 2050 and we asked the simple question: can we reconcile the energy demands of that society of 2050 with the very aggressive carbon reduction goals set out under the executive order in 2005 looking at our carbon budget that's 80 percent less than where we are today.

So we basically set about trying to envision what the California economy might look like, where all the sources of carbon emissions might come from. It was a study across the full economy. Not just the electric sector but the transport sector, including both light duty as well as heavy duty, rail, shipping, aircraft, etc., commercial, industrial applications and we went through a series of stress tests to see if we could power the economy entirely on one resource or another. Ultimately, the number one takeaway from our study was that with projected population growth, with an economy that's projected to be roughly double what it is today, there's simply no way to meet the 80 percent carbon reduction requirement without first investing in, basically, a step change in energy efficiency through a series of both technologies and programs. Unless we increase the efficiency of the economy by, in many cases, 80-90 percent where we are today in terms of use of energy per unit of state gross product. We didn't have a shot at all in

generating as much electricity or fuel that we would need to while still staying within the carbon budget.

That left us in effect with an electricity system after we applied all those efficiency savings of about 550 terawatt hours of electricity in 2050. And we set about looking of how one would provide that low carbon electricity with one of three stress tests: either all with nuclear power, all with fossil and CCS – carbon, capture and storage, primarily natural gas, although we also looked at coal with CCS type option and then the third option was all with renewables and you can see on this chart the sort of logical consequence of trying to meet that 550 terawatt hours of demand and the amounts of new generation capacity given that this would be 2050 where would we be 50 years from now. How much capacity would need to be built and of what type?

And what I want to do with my remaining time is focus just on the right hand side with respect to renewables. You'll notice that we would envision in this report, which was written up sort of as a separate sub volume, a system that is 90 percent renewable energy of that 550 terawatt hours. A good 70 percent of that is intermittent, meaning it's coming from wind or it's coming from solar PV. Either the utility or the distributed scale. That combined capacity when you bring on all of

the other technologies in the renewable space about 150 gigawatts with a little bit of natural gas that's available for load following, that's a residual carbon budget of course but it's small enough that we feel that we could meet the needs of fuel and for other activities in the economy that are going to be much harder to de-carbonize. In fact, one of the keys of our study is that if you get this electric system decarbonized it provides you with a range of more cost-effective options to go about removing carbon from the rest of the economy.

We outlined in very significant detail for each of the renewable technologies that we looked at, both the capacity that was available, the barriers to renewable energy and I'll just highlight many of the same topics that were discussed by my co-panelists. In particular it's about improving cost and performance, both on the generation of the technology itself but also on the ONM. And that's going to be particularly important as you see today's renewables coming to the end of life in a decade or so. Grid flexibility is very important. In fact we looked at three different ways to balance the supply and demand and when you think about the scale we envisioned to do that with renewables, there are a lot of different tradeoffs. Whether it's energy storage at both the bulk and the distributed scale. Flexible loads. As envisioned

from the smarter grid as my colleague from ITRON highlighted in his remarks, or natural gas and looking at more flexible natural gas turbines that can run effectively with low emissions but have rapid cycling that's going to be needed to meet the future demands.

As I wrap up I think it's important to keep in mind that renewables are one part of what we see as a power system of the future. You've got to continue to run the existing aspects and the existing infrastructure even as we're transition to this lower carbon future. We also need to take into account things like the smarter grid for which renewables are going to absolutely need that as a partner with cyber security, with consumer privacy, with pricing signals and policies that allow consumers to be much more interactive in participating in energy markets. And also issues on the horizon like water and land use. And, you mentioned yourself, Commissioner Weisenmiller, impacts to defense and other segments of society for which those don't go away when we start looking at a renewable future.

We have several research topics underway at EPRI to address those and certainly during the questions I'm happy to answer in more detail on those. So with that, I'll look forward to the questions and thank you again for the opportunity.

CHAIRMAN WEISENMILLER: Yeah. The question that I wanted to ask was in terms of – what are EPRI's top five renewable projects in the R&D side?

MR. HANNEGAN: Yeah. So, great question, Commissioner. The first one that we're looking at is a combination of getting visibility into distribution feeders where there's high penetrations of PV to try to understand number one: what's going on there. Most of the utilities does have visibility at the distribution level. Related to that once we've characterized the variability developing a range of options from smart meters to energy storage at the home, at the residential level, to try to balance that to allow for higher level of penetration of PV.

I'd also say that we're looking at lithium ion batteries. Not for transport purposes but what happens at the end of their life in a vehicle and can we use those in standardized commercial application that can provide grid-scale or community-scale storage.

And then on the generation side looking at high efficiency PV approaches that go beyond what's available in the market today that allows us to use more of the available spectrum. Right now you only focus on a narrow window of it. If we can upconvert the rest of that spectrum then you get much greater efficiency at the PV

cell.

CHAIRMAN WEISENMILLER: What sort of projects do you have in the ocean technologies?

MR. HANNEGAN: We have been partners with the Department of Energy in conducting wave and tidal energy assessments. We're partners at the EMEC facility in Europe that's doing the in-field testing. We had been in discussions with PG&E regarding the Wave Connect facility and doing some independent testing and environmental assessment there. And I think that's the kind of thing, I think my colleagues from – my colleague Milos indicated that that would be very important to do and I fully support that step.

CHAIRMAN WEISENMILLER: Thanks.

MR. HANNEGAN: Thank you.

MR. ALDAS: Thank you, Bryan. I think that sets the stage for Lew's presentation. Lew will provide us with some more policy context to clean energy technology and I think this will also set the stage for the next panel this afternoon.

MR. MILFORD: Good morning. My name's Lewis Milford with Clean Energy Group, Clean Energy States Alliance. I want to apologize for being late. I've been on the road and my schedule was telling me it was at a different time. But I think this is much better,

actually, that I talk after everyone spoke than before.

What I'm going to talk about is probably the larger policy question that's facing many of the states which is how to address the question of technology innovation? Energy technology innovation. And if I can spend just a minute also on the financing question that's come up, in terms of how to finance many of these technologies to scale.

The presentation that I'm going to give was actually a joint one that I gave with the Brookings Institution and the ITIF Foundation in D.C. I'm a fellow at Brookings and a lot of the material here – and some of the material here comes from a very good report they did on the state of the cleantech industry.

This is a paper we did together a few months ago which basically talks about the trends at the state level from project finance in the clean energy space to many states now engaging in much more aggressive actions to support economic development strategies around clean energy. I won't get into this in any detail. The link is there but I think the trend is clear that states are generally, now that they've spent a decade financing individual projects, are looking to ways to introduce policies to deal with many of the economic development gaps to build out the industries in their states.

This comes from the Brookings paper that was done a little bit ago. This is information that we all know. Billions of investment in the clean energy sector. It's also the site of innovation around the country. It's spatially arrayed by state and also by metropolitan area. It's a fairly diverse clean energy technology, economy across the country that's emerging. But despite the price declines that we've seen it still requires special treatment as we all know. Either through subsidies and other measures and there are the multiple valleys of death that we're all familiar with. Every time a new paper is done there seems to be a new Valley of Death that's identified; there are several depending on the technology.

And what makes this situation worse is that, and this is from a recent Brookings paper, in the next three years we are likely to see a 75 percent reduction in clean energy subsidy support for the clean energy sector. It's a funding cliff in fairly historic portions. Obviously, a lot of this is the end of the ARRA funding, which is a fairly significant — and a lot of this is going to bear down on the adoption and deployment of subsidies and credits that have grown the industry in the last three or four years.

There's been a historic and chronic underdevelopment, underinvestment, in R&D that will

continue unless something changes.

You know the good news, of course, is that states have been in the lead. California's obviously one of the — the leading examples but other states as well as a long list of policies from emission standards to RPS and net metering. You're all familiar with these. New Green Bank, PACE Financing and other loan programs. But I'd say generally the main point of this talk is that states generally have been slow to address technology innovation and industry building in specific policy areas beyond the project support, project subsidy, role. And I think it's fairly clear that project subsidies alone aren't sufficient to drive large and particularly innovative and new technologies that many of which have been discussed this morning that I've heard.

And I think is, again, as important as the renewable portfolio standards are and we lead a national group of all of the state managers of RPS laws around the country. They, generally, are low cost based policy provisions with the exception of some of the carve outs that have emerged. For the most part RPS laws have not been very effective in driving emerging or innovative technologies, and there are other issues with RPS but the main point, I think, is that one.

And so I think the main challenge is for states

that generally have funding/financing programs. It's dominated by project-based funding, fairly limited authority and support for economic development programs. Not enough information about the industry, not enough collaboration and states acting in isolation, which is a historic problem and difficult to solve.

So what we suggest here, and I'll get into this in a little bit of detail without spending too much time on this, is I think to advance these policies to encourage more innovative technologies, building database, focus more on technology innovation, move economic development into the main stream, into the center of policy making, support clean energy in cluster initiatives and a lot more collaboration.

You know the database, it sounds fairly simple, but in many states, you know, there is not a clear identification of the nature of these subsectors. What exists, what the gaps are and therefore you need that in order to tell you where you may be making the smart policy interventions.

Innovation. You know, again, I think with the pressure at the federal level if we're going to be competitive internationally I think states have to step up with specific technology innovation programs. I mean some of the ideas may be to use the procurement policies that

have been clearly identified and used in RPS programs to begin to drive emerging technologies through utility mandates. That's something we can talk about more. Creative financing to bridge the valleys of death, reverse auctions through XXX was not supposed to be XXX but for emerging technologies the papers have been done on the idea of using reverse auctions to try to get lower cost technologies. CalCEF, who I think you'll hear from today, has done some good work in this area. And efficacy insurance should be efficiency. It should be efficiency insurance for CalCEF. Could be one way to address this warranty and other question that is which is, now an area of insurance that is simply undeveloped, not developed.

I've sort of addressed moving this cluster development into the main stream, more collaboration. Let me just end this with some thoughts on financing. Recently we've had a number of conversations; we've entered into a partnership with a national organization of the bonding authorities around the United States. These basically are the municipal, regional and state bonding authorities. There are thousands, 50,000 of them, around the U.S.

That's the way we have essentially financed the infrastructure today: roads, bridges, hospitals, public and private facilities. New public and private

partnerships that are emerging from these bonding relationships. Our sense from dealing with them is that among their membership is how to finance clean energy projects is their top priority. And this is a, just to give you a sense of, these are some of the examples – there are some emerging examples of the use of bonds. I know California has done some of this in the regional and local level to do solar financing, efficiency financing and also some wind development.

Just to give you a sense of scale, recall that if you look to 2011, essentially the economic value of the federal ITC, the investment tax credit, and the Production Tax Credit together, was about $7 billion. $7 billion.

This is if you look all the way to the right, in the first three months of 2012 – this is, essentially the level of bond financing that has occurred in the United States. Almost $80 billion. So that, in effect, in about four days of municipal bond financing we have the equivalent amount of the total amount of 2011 of federal support for ITC and PTC. It's not to say that this is a perfect fit or that it can be a replacement but I think that if we're serious about thinking of how to finance these technologies to scale these entities have figured out how to access capital markets. I mean the holy grail of clean energy financing is how to get the capital

market, institutional investors, pension investors, to invest in this area. Lower cost capital, longer term capital as well. And I think that there's an opportunity now to deal with these entities in a serious and dramatic way to educate them about the clean energy opportunities and then to educate the clean energy players about the bonding opportunities. There's a marriage here to be made, that's my point. And then again we may not get there tomorrow. These may not be perfect fits. Use of bonding authority will presumably depend on some continuation of whether state or federal support to sweeten the capital stack but there's an opportunity here to bring in a significant amount of additional debt. How this fits with more unconventional or innovative technologies is part of the challenge here as well. But I think, again, combined with other creative tools, perhaps efficacy insurance, use of reverse auctions – the bonding guys will tell you, "If you give me a long term power contract and a creditworthy partner, we will figure out how to float a bond."

And so there are, obviously, a lot of issues underneath this but I think it's an enormous opportunity that we need to exploit.

So, I think that's it. Thanks for your time. I'd be happy to answer questions.

CHAIRMAN WEISENMILLER: Thanks. First one I had was the tax equity market more of less collapses in 2008.

MR. MILFORD: Right.

CHAIRMAN WEISENMILLER: So part of my question is where is it now?

MR. MILFORD: I think that it's not much better. You know, as of the last numbers that I saw, you know, there are only about seven, eight, nine or ten banks that are in the tax equity business.

So it's a very small cast of characters that are still in the business. I have not heard that there's been a significant upswing in the numbers of the availability of tax equity. And I think even if it was larger, even if it were larger, and the numbers were greater, you know, I think most of the people in the industry would tell you, and this is no surprise, this is not the perfect way to build an industry. Through a very limited number of players, where the cost of capital is significantly higher than what it might otherwise be and then, obviously, relying on boom and bust of federal approvals. And I think some of the value of looking at a more, essentially, distributed financing mechanism or mechanisms through bonding infrastructures is that it may be a more durable, less partisan way to raise capital at a local level. So I hope that answers the question but I think it it's – I

don't think it's significantly improved.

CHAIRMAN WEISENMILLER: Okay. So the two follow-ups there are first, obviously one of the – the tax equity market or approach or tax incentive generally, one of the complications is for foreign companies, that obviously it's much harder to monetize the value as opposed to a feed-in tariff. So part of the question is how – in terms of the PPA versus the feed-in tariff type of structure how does that interact with the financing issues? Obviously, feed-in tariffs are a very tough issue to deal with –

MR. MILFORD: Yes. Right.

CHAIRMAN WEISENMILLER: But I assume on at least the monetization of the assets. Presumably it's easier?

MR. MILFORD: Maybe simpler. I'd have to think about that. I'm not sure I've got a quick answer to that but let me think about that problem.

CHAIRMAN WEISENMILLER: The other thing is that in the cogeneration business there was that sea change when things moved out of project financing much more to the 144A market and that took, certainly, the rating agencies to step in and starting to rate the portfolios so the investors in the 144A or the bond industry generally was more comfortable dealing with the assets.

MR. MILFORD: Yes. Yeah. I think, you know, I

think this is part of a – right now, as far as I can tell, no one is sort of systemically trying to figure out how to create a similar transition in this area whether for wind or solar or other technologies as you described in that sector.

So I think that's part of a very significant challenge. You know we really don't have a focus on this potential alternative source of financing working with the public players, working with the bond council, underwriters and others to try to figure out if it's possible to, you know, at least have many of these types of projects brought within an infrastructure financing realm.

CHAIRMAN WEISENMILLER: Cause certainly part of the driver at the time was you had the rating agencies looking at it as a real business opportunity.

MR. MILFORD: Right.

CHAIRMAN WEISENMILLER: And getting into it so the question now, obviously since then, the rating agencies have also been hammered post 2008 on just the basic business model but, again, it's – part of the question would seem to be how to get the rating agencies to get comfortable that the infrastructure if there. Now, having said that, if you have assets where you can't even get a performance guarantee for 10 years, it's pretty hard

to imagine you're ever going to get a 20 year bond behind it.

MR. MILFORD: Right. I think there are two issues. One, I think is that, for the, you know, conventional technologies. Let's say we're still looking at solar and wind and other conventional technologies. I think — and so this is just simply, not simply, but a matter of scaling up without the problem of rating agencies and warranties and the like. So I think there's that whole area that still needs exploration. There's a significant scale up problem. And then I think when we're dealing with more innovation technologies you have the issues that you face. No doubt. I don't mean to stress — what I don't want to leave you with is that this is only a financing option for innovative technologies. And I think it may be in the short run that the more significant opportunities are for scale up and financing of those technologies that don't raise technology risk.

CHAIRMAN WEISENMILLER: Right. I mean — it's not obvious that there's not many financing sources that are more mezzanine or whatever where there is technology risk. Not on a significant scale.

MR. MILFORD: Right. Yeah. I think that's right.

CHAIRMAN WEISENMILLER: You know. And some of

these are certainly looking for that money. And that's what the, you know – basically that question in part then replaces the federal guarantee program because that could certainly deal with, like, how to get the first heliostats financed or something.

MR. MILFORD: Yeah. I think that that's – that's to be figured out. That's an issue. You're still going to need something else but at least you have players that are beginning to ask whether they can participant in this game in a much more significant way, which I think is a good thing and we should take advantage of it. Questions? Okay.

CHAIRMAN WEISENMILLER: Thanks.

MR. MILFORD: Thanks very much.

MR. ALDAS: Thank you, Lew. The – I guess the floor is open for discussion. If you, if the panelists have questions or Lew's presentation or Commissioners for a question to our panel of experts I can kind of start this. If you have any follow up comments related to, say, the financing on your specific technologies, I think, some or all of you have addressed it by topic. But I think some or all of you have addressed that in your topic but if you additional comments related to, say, financing strategies, government support, to your specific areas, I'll just go around the room and see what you comment about it.

MR. SIMONS: Well, I think it's – it's fortuitous that BrightSource will be here this afternoon. BrightSource, of course, dropped out of an IPO a couple of months ago. They have 2.3 gigawatts of projects that are under development for California. And what Lew just talked about seems like an opportunity that should really be looked at for central station type facilities. That the risk is certainly much lower than the innovative technologies and there's a dearth of financing options right now so I thought it was very interesting, and see that as a great opportunity.

MR. GLASSLEY: I agree with what George just said and, in addition, would like to just emphasize the importance of what a number of people gave presentations today touched on this issue. The ability to find ways of putting together multiple resources and financing those is a missed opportunity right now, I think. Many places, communities, reaches in the state have the opportunity to do something that combines resources but there isn't a lot being done in finding innovative ways to finance those. And I think that is an area that could be an interesting funding option for the financial market.

CHAIRMAN WEISENMILLER: Yeah. But, again, it's – I sort of struggle with the concept because if you take a capital intensive technology where you have trouble

right now getting that in the equity and getting coverage ratios, if you combine a second equally capital intensive technology, unless you really have some economy's transmission, operation or something it just seems like you take a very tough financing problem and make it at least twice as tough if not square it so you know you really have to make a convincing case that you have some synergies or complimentary there and not just making or — you know. And in my year doing project financing, I knew I can think of one project where people were trying to combine technologies and it was just a total nightmare that you never quite got there.

MR. GLASSLEY: I think it's an area that is absolutely new and there's not a lot of experience in how to do it effectively. But I think there's a number of situations where benefits are tremendous. For example, in the Imperial Valley, currently the way things are set up there right now in terms of both solar and geothermal is that they're located on separate sites. That means that the footprint environmentally is huge. It means that the permitting effort on both projects ends up being separate and long-term. It means that transmission facilities have to be doubled in terms of transmission line distance. Whereas if you combine those resources, in places where it's appropriate to do that, you can eliminate many of

those costs and challenges in time and the result is you increase your output and decrease your cost. In situations like –

CHAIRMAN WEISENMILLER: Yeah.

MR. GLASSLEY: Those places have to be carefully selected and that's part of the challenge.

CHAIRMAN WEISENMILLER: And technologies have to really – they have to fit together. I mean certainly when people look at the profiles for wind, you know, and what that means on the transmission line and the question is do you have something that complements that profile?

MR. GLASSLEY: At the same time if you combine, say, wind and geothermal which is baseload or geothermal and solar you have the capability of diminishing some of that variabilities simply because you have that baseload already there and the variability of those other resources on top of that.

CHAIRMAN WEISENMILLER: Yeah but geothermal, I know, you know, at one point we were – I was trying to negotiate a contract where the geysers would have been dispatchable.

MR. GLASSLEY: Mm-hmm. Mm-hmm.

CHAIRMAN WEISENMILLER: And it can be dispatchable. That's the bottom-line. But the economics you couldn't make sense for that capital intensive

technology, to suddenly reduce its operation to, say, 50 percent. Or 30. You know — so, I mean, in theory, you know — so again, it's in kind — so hopefully someone will figure out how to do a homerun on that but I'm just saying for a very capital intensive technology to make it dispatchable you just have to deal with the reality if you get half the revenue, you know, more or less you get some value for the additional integration costs. The savings. But those are very small, very small compared to the half the revenue the guises would have gotten otherwise.

COMMISSIONER PETERMAN: I think I would just add to that, this is Commission Peterman, and first of all, hello, everyone. I had another meeting to go to this morning. Sorry I had to miss the initial presentations but glad to be here.

Based on the comments we've heard from the Chair and, at least the panelists comments we've heard so far, it seems that there are good opportunities with co-location but we need to identify what the best opportunities are first for proof of concept and for financing and so it'd be great to hear in your comments that you file some of those examples.

MR. GLASSLEY: I think you're absolutely right. I think there's a lot of work that needs to be done to identify where those opportunities exist. I think we're

just beginning to explore that possibility. And part of what we – there was a project that we undertook in collaboration with several other renewable energy collaborative looking at the opportunities existing in Southern California. There are opportunities that do exist in the L.A. basin, they're very localized, but they nevertheless exist. Same thing is true for the Imperial Valley. And I think that was simply the first step in moving in the direction of finding those most optimal opportunities for developing these kinds of co-located resource potential.

COMMISSIONER PETERMAN: Appreciate your point that many of these benefits are local because a theme throughout the workshops we've had so far is the opportunity for counties and local governments to do more comprehensive planning around renewable development. And we will be speaking to some particular opportunities within the state and so identifying the geographic areas as a part of that prioritization would be beneficial.

CHAIRMAN WEISENMILLER: Yeah. I think the other thing on a geography part, you know, and there's a common concern on permitting and stuff but one thing we've learned very much in permitting is location really matters. If you pick a stupid site it takes you forever and that's come up in the mitigation. If you pick a smart

site it's still not going to be easy but at least it's doable. So it's very important on all these technologies to be smart about where people try to put them. And I suspect, particularly as ones looking at that and the co-location opportunities in the local aspects, it's very important. But, again, you could pick a geothermal site that can go very fast through permitting or one that's just never gonna happen.

MR. GLASSLEY: I appreciate your comment and I think that you're absolutely right about that. You – it is possible to be smart about this. At the same time the permitting issue isn't so much with the Energy Commission and the way that it goes through the permitting process, the 49.9 megawatt, you know, line. What complicates it to a great extent, at least for geothermal but I suspect this is true for most of the other renewables as well, is that there are also a lot of local regulations that have to be met because of local concerns and idiosyncrasies. And, in many instances, at least what we've found for geothermal is that the issues that arise are often the same but they're administered differently and results in very inefficient processing of permitting when it would be possible, I think, for the state to provide not a dictator way of doing it but guidelines for what the best practices are for moving forward with projects like this. Both for

the developer as well the local communities and –

CHAIRMAN WEISENMILLER: Yeah. We did. We, with BLM, did sort of a guidance document on best practices and, generally, what we heard – and a lot of that was really trying to make sure that a project was good in terms of screening and, I mean, all – you know, but generally the developer said, "Oh my god. If we do all of your best practices, it's going to be too expensive." And generally the environmental participants said, "Gee. You really didn't go far enough." So there is a sweet spot there. I'm not necessarily sure we found it. We're certainly happy to get comments eventually from people but, again, best practices are certainly in the eye of the beholder.

COMMISSIONER PETERMAN: I'll also add that, at least in a previous workshop, I believe it was the one geographic siting, we heard from the association of counties. That they've developed a streamline permit for solar PV and so it seems that something that could be followed up on is extending that to other resources as well. And it's good to hear about, for example, some of the geothermal challenges, which I have not been familiar with.

Also we've heard though from parties, particularly business developers, that identifying the

right location is part of the business model and, you know, competitive advantage. And so we're trying to walk that fine line as well by giving guidance versus being clearly identifying everything that competitors would like to be able to identify in order to assert their value.

Should we move on?

DR. BROUWER: Sure. This is Jack Brouwer from the National Fuel Cell Research Center. I just want to make a couple of comments because I think that the biogas and biomass resources that we have around the state, they're generally distributed and fuel cell technology offers one of the best opportunities to make good value out of that resource. Offering, of course, very low emissions when it converts these biomass and biogas feed streams but then also offering high efficiencies. So to meet the 33 percent goal it'll give you more energy per unit of biogas or biomass going in. And then it also offers this opportunity, like some of the other renewables like geothermal, to be dispatchable or, at least, continuous power so it has a different signature when it works on the grid. So I think those features engender some really neat characteristics.

One big, I think, investment that could be made that would bear a lot of good fruit, I think, would be to look at gas clean up systems. These are quite expensive.

Also, costly to maintain. Adding a lot of cost to the operations on biomass and biogas for both fuel cells and other alternative energy conversion devices. So, you know, gas turbines and other things like that. So that would be a nice area to invest a little bit of money in.

COMMISSIONER PETERMAN: Thank you for those comments. When thinking about fuel cells and the challenge that we found is that the economics in terms of using renewable fuels are hard to reach and just wondering if maybe you could do this in your initial comments and please just let me know if you did. I'll review the transcript. But if you wanted to comment at all on what the economic needs are in terms of being – of allowing fuel cells to use more renewable fuels. Where are the constraints? Is it in the supply? At a price will it be available? If you could speak to that.

DR. BROUWER: Well I didn't necessarily comment on all of those things. The – but it is very important because operating on a renewable fuel does add a lot of cost to the initial cost of the system and even the operating cost. I believe, though, that with the SGIP offering an increased incentive that's very helpful for renewable use of renewable fuel use and fuel cells. The other thing that has – that could be helpful is to allow the introduction of these fuels in the natural gas

pipelines and to allow it to be wheeled throughout the state, which it doesn't necessarily – which isn't necessarily allowed everywhere for all types of biogases. That's being worked on. So I see some light at the end of the tunnel there.

I think also establishing feed-in tariffs is going to be very important. And we've heard several other speakers talk about feed-in tariffs as being helpful for the community.

COMMISSIONER PETERMAN: Thank you.

MR. PREVISIC: So, Commissioner Peterman, I know you haven't had a chance to see my presentation. I spoke on offshore wind and wave power earlier.

In my mind and just looking over your list of questions here there's some unique opportunities. The opportunities that California has a tremendous potential for offshore wind, deepwater offshore wind, as well as wave power. Deepwater offshore wind on the order of if you just look at water that's within 60 and 200 meters or 60 and 900 meters, I believe it is, it's on the order of 200 gigawatts and then wave is on the order of 5-20 gigawatts type of potential.

So tremendous resource potential that we could potentially harness. There's some unique opportunities if we're looking at trying to develop a pathway to adopt

these technologies. There's some oil and gas platforms in Southern California, particular platform Irene. They're grid connected. We could directly tie demonstration schemes off those platforms, assuming we get permission to do that. But it would eliminate a tremendous amount of infrastructure costs to connect those plants back to the grid and it would be a tremendous demonstration opportunity for both, I think, combined offshore wind as well as offshore wave technologies.

In terms of cost protections, I mentioned this earlier, but they're expensive now. We know that's very typical for early adoptive technology and we expect those to reduce pretty rapidly. That's very typical for early stage technology development.

The last thing I want to mention is tremendous partnering opportunities. And the two main entities that sort of have a strategic interest in the marine renewables is the U.S. Navy and they're very active participants in a demonstration project in Hawaii. That they're working together with the U.S. Department of Energy with that's moving forward. They actually have a cable in the water and they're moving forward a very small demonstration project.

And the second one is the U.S. Department of Energy. U.S. Department of Energy has an active wind and

water power program. Under the water power program they look at MHK, marine hydro kinetic technologies. Wave is a strategic focus within that area. The other areas offshore wind and they just closed recently a solicitation of $180 million to build between 4-6 demonstration plants around this country.

COMMISSIONER PETERMAN: What kind of capacity factors are expected with these various technologies?

MR. PREVISIC: Offshore wind is probably on the order of 40 percent in good sites. Offshore wave is on the order of 30-40 percent as well. It's site specific, obviously, but California resources – we looked extensively, particularly up north towards Humboldt County at some potential deployment site. Actually with the Wave Connect Project, which ended up not moving forward, but we did quite a few studies and were looking at 30 percent plus sea factories.

CHAIRMAN WEISENMILLER: Yeah. I had one question. Obviously, when one looks at Chevron's expert efforts for offshore development of oil and gas platforms off Santa Barbara, at some point they just – after I think of about a decade rose the white flag and left. And so I guess the question in part is, you know, how realistic is it in terms of the sensitivity? I mean, you're point was if we could go far enough off shore that will dampen the

public opposition but, obviously, using existing platforms, you know, may or may not unite those issues.

MR. PREVISIC: It's a good point and I think there's some political sensitivities around offshore development that would need to be looked at. In general, I think that the pushback against oil and gas was directed against oil and gas. It wasn't necessarily offshore platforms, per say. So I think it's important to make that distinction. There's been, actually, quite a bit of support for some of these demonstration projects moving forward. Obviously, the future will prove — I mean once we start developing a pilot plan and I think that's why it's important to actually move forward with pilot plant to really start understanding those issues a little bit better. It's probably a little bit more pronounced with offshore wind than offshore wave. Offshore wave technologies, they're just so low lying. It's really hard to see them from shore unless you have sort of perfect visibility and it's a clear, nice day. Offshore wave, obviously, with the tower height that introduces the visibility issue from shore. And, I think, that needs to be looked at a little bit more closely.

Southern California has a lot of waters — water depths that are sort of suitable that are pretty far offshore right around, you know, Catalina Islands. Those

sort of areas. Where you could actually push deployment pretty far offshore. So I think there's some interesting areas. It also happens to be great wind use resource, offshore there, as well as a wave resource. So there's some interesting opportunities there.

CHAIRMAN WEISENMILLER: Yeah. I was going to push you back on your comment about offshore opposition in terms of thinking back to the Cape Cod issues. You know –

MR. PREVISIC: Yeah. It's – it's probably a difficult thing to really understand how public opinion will shape with any of those issues, but – and I think you're right. It's a critical issue that needs to be looked at. Yeah. Yeah.

COMMISSIONER PETERMAN: Thank you. Before we move on to the next speaker I just had one follow up question for Dr. Brouwer on fuel cells.

So at the Commission, historically, we've funded through the ERA Program small fuel cells, less than 30kW and we've seen significant interest in this market in the last year because of some changes to telecommunication requirements. They're requiring cell phone towers to have backup generation and there's an opportunity there to have fuel cells that are using renewable power. Currently, these are being used primarily, almost exclusively, as backup power. And, looking forward, wondering if you had

any insights about the potential for the small systems to be used for primary power. Whether the investments that are being made now by the telecommunications and the railway yards are getting to the commercialization scale that would make it cheaper for primary power use at the home level. Is this is an expectation for the industry going forward?

MR. BROUWER: There have been a lot of technical developments in this area, especially associated with proton exchange membrane fuel cell technology to allow the stack technology to last very much longer than it previously did. Some really interesting insights into cell degradation phenomena that actually led to this. So that we have proton exchange membrane technology like that, which is installed in some of these telecommunication sites that could be dispatched and served many more hours than they were originally designed to serve.

I guess, though, that the current installations would have older technology that would probably better be dispatched only, like, during critical peak pricing periods. Not necessarily on a continuing basis because I know if you use those on a continuous basis the stack would fail after 10,000 hours or so.

So that’s what I would envision the current

technology being able to do. But new installations could very well be used for more continuous power and dispatch, you know, whenever the grid would need it, for example.

COMMISSIONER PETERMAN: Thank you.

MR. PREVISIC: I have a brief additional comment, if I may, and I know I sort of – I didn't quite respond to your question earlier, Mr. Weisenmiller, on time horizons for this technology to become commercially mature.

My sense is if you just looked at a demonstration case, and that's really what has to happen before we can talk about any commercial deployment. Is we need to demonstrate the technology at say 5-10 megawatt type of deployment capacity. You know, you're looking at permitting 2-3 years, another 5 years of demonstration. So you're time horizon is on the order of 5-10 years before you could actually make a choice whether you wanted to adopt it commercially within California. And that's sort of independent of what the technology is doing. The technology itself is coming along pretty well. How rapidly it reduces in cost remains to be seen. But maybe that gives the first order estimate in terms of time horizon that you were looking for.

CHAIRMAN WEISENMILLER: That's helpful. And, again, obviously everyone has the opportunity to

supplement their comments in writing when the responses come in. One of the things that would be sort of useful to understand is we did have PG&E's efforts to really do that, you know, demonstration which they spent a lot of time and money on, which is basically at some point, I don't know, we'll say washed away. But anyway trying to figure out what we learned from that effort and how to move forward.

MR. PREVISIC: Yeah. The PG&E effort was maybe a little bit unfortunate with how it ended, certainly. I think what we learned from that effort was certainly we identified some really good deployment sites. You know. Initially we started off in Fort Bragg. We did some concept studies. I was actually with — under EPRI's tutelage back with Roger Bedard. We started that process and that goes back now 6 years, or 7 years, so quite a while back. And then PG&E started to take over that project. But we started at Fort Bragg. There was quite a bit of public opposition in Fort Bragg, actually, against wave power.

We moved to Humboldt, Humboldt has a little bit better port infrastructure and that's one of the lessons we learned. You've you gotta be very close to good port infrastructure to support that demonstration plan. But relatively costly just because you have to bring these

cables out, about 3-4 miles, into the ocean. And so the infrastructure cost was pretty high.

And, as a third option, we actually looked at, you know, down in Southern California at that platform Irene. And that's sort of where the opportunities sort of converge. But, you know, just by leveraging these sort of infrastructures that are already in place you're saving on the order of $20-$30 million right off the bat and it makes it much easier because a lot of these areas have been already studied. So around these oil and gas leases all the environmental work has been done to an excruciating detail, collaborating all these studies into a demonstration project, which has shortened the time horizon quite dramatically. So there was quite a bit of learning out of that process. It was unfortunate that it terminated but there were definitely some takeaways there.

CHAIRMAN WEISENMILLER: Where you involved in the efforts to looking at more tidal in the Bay Area?

MR. PREVISIC: Yes.

CHAIRMAN WEISENMILLER: And, again, what were the lessons learned from that effort?

MR. PREVISIC: The lessons learned from that effort is that – I have to back up. That was 2004 that we did a study under EPRI again. We did a resource assessment, a very crude one. We spent $10,000 on that.

And we did a conceptual design. The issue that we didn't quite understand back then is power density in the tidal stream is velocity^3 so if you make a little mistake in your flow velocity in your stream then you're really far off with your power density and power production numbers. Very important — and I think just because we didn't spend enough time and money on the research assessment we over estimated the resource on the Golden Gate Bridge.

I think the finding now is that the resource is pretty small, and that it wouldn't support any commercial developments. And I think that's true for all tidal resources in the state. There's really not any substantial tidal resources in California.

MR. HOUSE: One thing that would be very useful is a financing mechanism for the distributed generation technologies. They're — they face the same problems that the larger utility scale renewables but it's amplified.

If I'm a water agency and I want to put in a solar facility, one megawatt solar facility, it's going to cost me $5 million. I can go out to the bond market and I can actually bond that. If I wanted to do the same amount of capacity with 3 330 kilowatt hydro facilities I'm going to get 3 or 4 times as much energy but it's only going to cost me $1 million.

It's very, very difficult. If I don't already

have that money set aside it's very, very difficult to go out – because the underwriting costs will just kill you if you end up doing that. The other problem is as opposed to dealing with the when you're – when you sort of group these together instead of doing the due diligence on one particular facility you're doing it on three separate facilities and so basically what we're seeing in the small hydro industry in California is if you go and talk to a water agency, if they don't have money set aside currently to be able to do this, it is virtually impossible to get these things financed. So if there were something and there's thousands and thousands of these sites around the state. So if there some mechanism in which you could get a financing authority that deals specifically with smaller, you know, under one megawatt distributed generation technologies that would be very, very useful.

COMMISSIONER PETERMAN: I'm just sitting here thinking about the array of financing mechanisms that we have available for DG and to what extent hydro qualifies for them. And I want to – I don't think they do.

CHAIRMAN WEISENMILLER: Yeah. Well, again, it sounds like, again – I was going to ask Lon the question about why don't I do JPA of aqua members to try to do it. But, again, that's not going to address the every single project needs due diligence on the engineering and the

finance, etc. package and the due diligence is going to kill you.

Typically, the smaller sizes on the financing side, you try to do leases. Obviously since, you know, whatever the right threshold is to do project finance project and the cost, certainly millions of dollars. So you can't make it work. But, I mean, I know Backtrack and Brown at one point was trying to do a general services, would still try to do more lease packages for things that were under $1 million, say.

MR. HOUSE: And that's exactly one of the things that is being looked at is setting up some sort of joint powers authority to be able to bundle a bunch of these together. But when you set up a joint powers authority it becomes another government entity and it's got the — there's a lot of issues with ownership and who gets responsibility and who gets the risk associated with this. SO like I say that's one of the things that they're looking at but basically now the only sites that are being developed are water agencies that have money that's been set aside in their capital budget they can allocate to some of these projects. And if you have to go out and you have to finance these projects, the developers are just walking away from them.

CHAIRMAN WEISENMILLER: And, again, it would

seem like one shot would be if the manufacturers would just, you know, want to actually sell their product. There they do equipment leases. You know, presumably they could roll through the whole market in California.

MR. HOUSE: They could but this is such a new market, the sub one market, and if you're looking at it as some of the big pump manufacturers and doing the pumpless turbine. The problem that they had with leasing it is that you're taking the pump, you're changing the impeller somewhat but you're throwing a bunch of electronics on it to hook it into the grid and they're saying, "Hey. This is not our machine now. You're messing with it and you're making it do things that we can't control. And so we're not going to lease it because we don't produce the whole package." So it is a bit of a quandary.

COMMISSIONER PETERMAN: Thank you. That was some interesting insight. Should we move on?

MR. HANNEGAN: Yeah. Thanks. So I'm Bryan Hannegan with the Electric Power Research Institute. I'm also an elected member of the Board of Coastside County Water District. So a lot of what Lon just said is absolutely spot on. We're going through our budget process right now and if we don't have the money set aside from a capex there's no way we're going to move forward on a project, even though the energy costs are one of the

highest parts of the operating budget for the district. So, one of the things that I might suggest is that that would be a good question for your I-Bank witness later this afternoon. There's a lot of I-Bank activity going on just in the course of normal reservoir refurbishment, pipeline placement, etc. It seems to me that those would be excellent times to consider some of these energy opportunities as well.

And that's one of the comments that I wanted to make. We've heard a lot this morning about specific components and it's important to step back, I think, and say, "What kind of system are we trying to create?" And that was one of the outcomes of our California Energy Futures Study that I spoke about this morning. Is that the power system, the water system, the economic system in 2050 under the low carbon requirements are very different than what we're doing today. And so one of the things that I'll stress as a follow up is we're really talking about two different financing issues here. Both the staff presentation and Lew's excellent report showed two gaps, one of which is a technology risk driven gap. Relatively early on in the innovation stage where collaborative R&D, test beds, demonstration projects. Those are all kind of the right horses for the courses for that.

The second is more about scale up and access to

finance. And I think that it probably more in line with what you're looking at here today but that's very different and very targeted on something for which you've already effect engineered out the technology risk. And in a way they're almost two different challenges with two different sets of tools that you want to look at. And furthermore, something for which there is a, I'd say, a generation or a value proposition that results in a direct payment back to the inventor or the investor is very different from something that's more an infrastructure play.

So a phasor measurement unit or a smart meter or a better inverter for distributed PV is going to have a different financing requirement than something that might be one of these, you know, great new devices that we've all talked about this morning. So it's important to keep that in mind as well.

The last thing I'll say is because this system is so very different and because you're dealing with two different challenges the tools are going to be very different. And one of the things that I'll just stress is you may want to think of financial opportunities where you've got multiple parties competing and collaborating at the same time. And by that I mean look at those test beds where you can create, similar to what's being done as West

Village, as UC Davis or what Jack spoke about with the renewable energy sustainable communities where you can get multiple people coming into a site with multiple different technologies and you get them interacting with each other as though you're trying to design the 2050 system. But you're doing it today so that you know where are the gaps, what's broken, what's not being financed, where's the business proposition and where does it not exist.

We have over 20 different smart grid type projects going on around the world. And one of the biggest lessons we're pulling from those is we don't know what we don't know about how the power system in 2050 is going to work. And that's driving our research activities forward. And, to that end, I might suggest you hold a competition. You say, "Here's what I want this community or this business park or this residential development to look like and act like; not just from energy but from waste and from water." And you invite collaboration from amongst the various parties to put their best foot forward and then you help them go do it.

CHAIRMAN WEISENMILLER: Couple of follow up questions. I mean the one thing which I noted to me by actually Michael Shames was the remarkable success of the X Factor or the X Prize types of approaches and so as a state one of the interesting questions would be if there

were – and obviously if you look at those there's not necessarily a lot of money in state with the prize as much as the prestige and so, again, trying to figure out where we could do that. And, again, that's something certainly EPRI may want to think also about.

The other thing, which I think we're struggling with too on the technology, and obviously the utility industry is not known as one of the more innovative, but that for a long time it was pretty easy to say this is the meter we buy or this is the transformer we buy. And as we were looking at the innovative technologies it's pretty easy to discover you've just discovered a million smart meters which are now no longer state of the art but, you know, trying to figure out what you're going to do with those. So exactly how do we deal with the utility industry when we're trying to deal with innovation? And frankly some of the new technologies that people are going to roll out aren't going to really work –

MR. HANNEGAN: Yeah. That –

CHAIRMAN WEISENMILLER: Or not be the ones that you really want to have put millions of things out there for.

MR. HANNEGAN: Yeah, Commissioner. That's a great point because both on the electric as well as on the water side there's an inherent conservatism in the

utilities, and I've seen this on both sides now. Where you're first responsibility is to make sure that the lights are on and the water is available. And your second responsibility is that that's largely being done at the lowest cost possible. That's what the PUCs will demand. And so there's this natural hesitation to bring on something to your system that's got any amount of technology risk whatsoever unless somebody's covered that for you. Either through PPA or what have you. Now I will say we have engaged a number of utilities working with Stanford University and some of the financial interests to try to look at what a shared risk structure might be to commercializing new technologies and moving things that are on the drawing board in the universities or are on an innovator's desk more quickly to market where they sort of pass that, "I'm number 3 in the queue, not number one," kind of thing. But that's a very difficult thing, I think, for the utilities to get their arms around because I think their sense is that they're not being given enough of a — enough of a direction, enough of a push forward that they can take some risks with rate maker structures with their IRPs, with a variety of different approaches so get more aggressive in the research space.

Something like the X Prize approach, which we are looking at out in the mountain West with respect to

carbon capture and storage I think is an excellence approach. The challenge there is how do you define the prize. What is it that's large enough for people to take a bite off of and here again when I talk about a competition, you know, maybe an X Prize type challenge for the first zero net energy subdivision or zero net energy university campus. Those are the kinds of things that I think will get people out of the component space and into the system space where we think it's absolutely necessary if you're going to achieve the step change in improvements that we need to in order to be in place by 2050.

COMMISSIONER PETERMAN: I'll get offer a related point. So specifically a concern of mine relates to distributed generation technologies. It's the warrant provisions because we were just talking about the risk that the utilities must assume but there's a risk that consumers are assuming by purchasing some of these technologies for which we have not had the experience or history with and to date, you know, knock on wood we have not seen significant difficulties with our DG technologies but figuring out how to – what the appropriate warranty requirement should be, what to do in a space where the competitive landscape is continuously changing and companies are going bankrupt is something that we need to further think about as we're scaling up. And I think the

points that were made about these, if you will, these community size, experiments, laboratories in terms of seeing how technologies actually work in progress is a valuable point related to that.

MR. HANNEGAN: I'll just add a couple of quick points. One of the ways in which we engineer around the opalescence question is to develop standards for interoperability and communication amongst devices and we at EPRI have worked real hard with that, both in the vehicle space and in the smart grid space so that if there is a need to go in and change something out you're not changing out the whole entire network, you're just changing out that particular component.

So sort of building with that planned opalescence in mind is, I think, important. The other point I'll make about the community competitive idea is that'll bring forward interested parties that will be more likely to be technology adopters and in so doing, I think, reduce some of the public pushback that we're seeing on things like wind energy and solar siting and so on and so forth.

We've done some interesting studies looking at wind turbine noise so to speak and in communities that have embraced and actually brought projects to their communities. We've seen far less incidents of complaints

about subsonic noise. Now we're still very much in the data gathering and the anecdotal stages but one of the theories is if you want it to be there you're less likely to see problems than if it's foisted upon you. And I think there's certainly some instances here in California that attest to that.

COMMISSIONER PETERMAN: Thank you. And I'd appreciate it if you could submit the formal record anything you have around the engineering work you've done around addressing opsalence issues.

MR. HANNEGAN: Absolutely.

COMMISSIONER PETERMAN: That was a good point to raise in the dialogue.

CHAIRMAN WEISENMILLER: Yeah. I think it'd also be good if you could raise – I mean, obviously, on the standards for thing like inverters, the home area network – it's really critical to get those right, which also means that may be a number of people complain about the time to do it. So giving us a sense of where we are on those interoperability standards, you know, is also critical. And, again, I realize that everyone would like them done yesterday and as you move forward you keep finding new cybersecurity or other things to worry about while you're doing them.

COMMISSIONER PETERMAN: Thank you. I'm aware

that we're encroaching on the Public Comment time but would love to hear your summary comments, Lew, or some of your reflections.

MR. HOUSE: I just have a few random thoughts, if I might.

On the financing issue that Lon raised. I think that if you look to what's happened at the solar bond market in New Jersey, just this is happening. That is you have aggravated — these are public facilities where solar is being put on public facilities with a bond that basically is floated for all of these small installations. So far it's been about $200 million worth of mini bonds that have been floated for that. It's a model that's worth looking at. I'd be happy to talk to you more about it. I think it might be interesting to try to explore.

In terms of the utility obligations and technology innovation, you're probably going to hear from Dan Adler and others later today but I think a combination of an RPS carve out for technology innovation combined with a reverse auction strategy, with an efficacy insurance backstop is at least an approval of policy measures that I think you're going to need to put in place or otherwise it's going to be really hard to do it simply through incentives.

In terms of the leasing model I think to do

anything to encourage more leasing of all of these technologies because what it does is it shirts the technology risk. I think apart from giving the developers potential access to capital markets I think actually one of the most significant maybe less appreciated elements of this and it's for fuel cells as well is it removes the technology adoption barrier for customers. It shifts the technology on the developers where it belongs. And then perhaps leads to turnover where otherwise it wouldn't. And I guess the last thing I'd say for siting for offshore is find places where major oil and gas developers don't have their second homes sitting there as at the Cape and that at least might get you a long way to moving some of the project. Thanks.

COMMISSIONER PETERMAN: Thank you for that. Let's turn to any Public Comment we may have now.

MR. ALDAS: Okay. I think it's about time for Public Comments so thank you so much to our panelists.

Any comments on the floor?

COMMISSIONER PETERMAN: Please come to the mic. We ask that you keep your comments to three minutes or shorter if possible. Thanks.

MR. DAY: Hello. My name is Michael Day. I'm with Rockwood Consulting.

One of the things that came up was moving the

technologies across the Valley of Death and I think that the IEPR has a real opportunity here. And, Commissioner Weisenmiller, you talked about things that are capital intensive. Meaning you really need to have full utilization to be economically viable. But I think there's an opportunity here and it deals with locational, marginal pricing and I understand that this is an intersectional area between you and the PUC. But it is in the IEPR realm.

With locational, marginal pricing merchants could deploy different technologies. It could be an auto-DR, it could be energy efficiency. It could be distributed generation. It could be storage if they could gain the avoided cost value that's inherent within certain congestion constrained areas they could make that cost-effective right now. And that would be then available to be contracted via normal supply contracts like you'd buy from any other generator. It'd be a resource. A megawatt resource. But there's some regulatory things that have to happen, you know, to get LMP value. To get ancillary services revenue and variable carbon values on an hourly basis. Some of the evaluation tools need to change. So the E3 calculator right now that's down to the climate zone level needs to go down to the nodal value. Cross silo program values. So if you

have an element that's auto-DR, you have an element that's energy efficiency, you have an element that's say low income energy efficient. The ability to construct a program that takes care of all of those and provide that as a merchant, as a resource, and then loading order enforcement. Including it in the long term procurement plan. That kind of stuff can actually make it work.

Just a quick example. Trane and Beutler Corporation are working with Edison at looking at deploying evaporative pre-coolers hooked up through an automatic demand response system as a very finely grained dispatchable megawatt resource for load balancing, which is becoming increasingly important as we all know, with the penetration of renewables. But what stands in the way? It's a lot of these functional, policy and procedural issues. Tools that haven't developed on the regulatory side that are preventing merchants that have access to capital from going and deploying that. And then once you get there, you're really kind of technology neutral. You're based on the performance.

Commissioner Peterman, talking to your concern about warranty risk. If the merchant is on the hook for providing X amount of capacity and they don't there's liquidated damages and I think that this is really something to get to.

And just one last observation for releases. In commercial properties, in offices and retail, you do start running into issues regarding loan covenant so if you take off one piece of equipment, put on something else, there's a subordination issue there that starts getting in the way of a lot of commercial leasing opportunities.

Thank you for the opportunity to speak.

MR. ALDAS: Thank you.

CHAIRMAN WEISENMILLER: Thank you. It's interesting because obviously with the ISO market we do have the nodal on the wholesale side, not retail, but at least — a couple of years ago, at least when I was looking at it, you clearly couldn't see a distinct pattern emerge over the year of where the sweet spots were.

I don't know if there's better data.

MR. DAY: And there's a lot of data through the Oasis System with CAISO down to the nodal level. We know that there's areas that have very high congestion constraints and very high prices that end up being disproportional impactful for ratepayers. For that matter, they also tend to be pretty dirty on the margin from their emissions. So something that we could do or at least putting it into the IEPR that that's something that we want to work towards. Where that locational, marginal pricing value can be opened up for merchants to deploy

mixes of technologies and be graded on their performance is something that I think as a business model makes a lot of sense for us going forward.

CHAIRMAN WEISENMILLER: Thanks.

MS. MALIN: Good morning. My name is Lisa Malin, I'm with Malin Engineering here in Sacramento. I'm also working with an industry – newly formed industry group to come together and work on some barriers that we see relative to the geothermal heat pump industry and its widespread acceptance here in California.

I want to speak in support of keeping the geothermal heat pump technology as part of the renewables package that you're considering. That's one of the issues that we have with the technology, is how to define it. Renewables, distributed generation. But what it does do for us is it helps us to achieve that 33 percent renewable portfolio standard, which is mainly through energy efficiency of that type of technology.

Earlier it was mentioned that cost is a major barrier to the technology and while that certainly is a factor there are several other barriers that contribute to that being perceived as the highest barrier to the technology. First of all, their treatment within the California State Energy Efficiency Standards. The technology is not properly modeled within that compliance

software and we would like to work toward measures to correct that.

There's no state regulation having to do with the geothermal borehole portion in the ground coupling of the technology. There's a draft well standard that's out there currently but it has not been adopted. So there's measures that need to be taken there. General education of engineers, contractors, government and public in general is required relative to the technology. There's a lot of misconceptions about how it works and why it works.

And then, finally, the tiered rate structures imposed by the ISOs on all electric systems. Even though we're very efficient, it is an electric system. I would think that it would be perceived as a good technology because it would give you a constant load on the utilities themselves between summer and winter whereas some of the other technologies are not.

So just in closing, I'm not asking for funding or incentive. I'm asking you to acknowledge the geothermal heat pump technology is part of the renewables program and would like to ask for your help in lowering — in leveling the playing field so that this technology could gain wider acceptance here in California. Thank you.

CHAIRMAN WEISENMILLER: Thank you. What sort of

warranties are available?

MS. MALIN: On the ground portion or the heat pump portion?

CHAIRMAN WEISENMILLER: Both.

MS. MALIN: The heat pump typically, depending on the type of warranty you purchase, 5 years to 10 years on the equipment which is in line with the other type of HVAC equipment that is out there.

On the ground loop portion it can be anywhere from 25-50 years on the pipe. Again, it depends on the manufacturer.

CHAIRMAN WEISENMILLER: Thanks.

MS. MALIN: Mm-hmm.

MS. WINN: Good morning. Valerie Winn with PG&E. A couple of things that I wanted to touch on here. I know there's been a lot of discussion of the WaveConnect Project and PG&E's involvement in that. And, you know, we've had a lot of different discussions and I think whenever there's a new technology and you're trying to move it forward for an individual company to take on that obligation when it's unknown what will be required financially. That was, you know, one of our challenges that we reached. Although it could be an opportunity for the state and the CEC with its permitting authority to perhaps look at opportunities to partner with different –

with other agencies and companies using some of the research dollars to perhaps permit a site and then consider auctioning off opportunities to put developments there.

So that something that could be a way to actually move some of those WaveConnect items forward without an individual company taking on that financial responsibility.

Secondly, I did want to talk about feed-in tariffs and other things that have been mentioned as opportunities to move things forward. You know we already have a variety of procurement mechanisms available and we know that, you know, in the RPS arena the focus has been on, you know, what is the lowest cost to customers.

So fundamentally we are opposed in the RPS arena for creating technology carve outs and status size might be a better use of R&D funds but, you know, let's not call it a renewables procurement program if it's really incentives and ways to incent new technologies.

And we have actually had conversations over the last few years in my former position in our renewable energy group with water agencies on their in-conduit hydro. And one of the challenges, you know, that we're running into is perhaps sometimes water agencies might be looking for a three of four year payback on the project

whereas our customers, if we were investing in a project there's, you know, the 30 year useful life, period.

So I think there needs to be some balancing as we look at what might be a win-win situation so that electric customers don't end up subsidizing customers or water agencies. I don't think that creates the right value proposition for the state.

Thank you. Happy to answer any questions.

CHAIRMAN WEISENMILLER: Yeah. I just thought. Thank you. I mean, I was actually going to say I don't know why you're giving the scale of PG&E to the extent that the commercialization was beyond your obligation and I'm looking around the room trying to figure out who else is bigger that can take on some of the technology stuff.

[LAUGHTER]

CHAIRMAN WEISENMILLER:

MS. WINN: The State of California.

CHAIRMAN WEISENMILLER: The State of California. But, I guess, in the fuel cell context there is some discussion of biomethane injection of biogas injection in the pipeline. So I wasn't sure if you wanted to say a few words on that?

MS. WINN: Well –

CHAIRMAN WEISENMILLER: Or least some of the risks there?

MS. WINN: We've had, you know, a number of conversations over, I'd say, the last year on biomethane in pipelines. And it's really very dependent on the type of biomethane. We had some initial success with dairy biomethane and were able to get that to a point where it could be tested consistently and injected into the pipeline.

I know Commissioner Peterman is very familiar with a lot of the (indiscernible) gas issues that we've encountered and our concerns about the safety of our pipeline and whether landfill gas which has unknown constituents in it because it's highly, you know, highly variable. Whether that can be safely injected into our pipelines.

And so more discussions will be — are continued — well discussions are continuing on that issue.

COMMISSIONER PETERMAN: Yea. Thank you. Do we have any comments on the phone?

MS. KOROSEC: I do want to open the phone lines only so that we can see if anyone there wants to make a comment.

COMMISSIONER PETERMAN: Please, do. They're all scrambling for —

MS. KOROSEC: I know. Our phone lines are open if either of our phone callers would like to make a

comment? All right. Thanks. We have no WebEx questions.

COMMISSIONER PETERMAN: Okay. Thank you for all the public comment. In the interest in keeping us on time with this Workshop I'll recommend that we wrap up.

Thank you to all the panelists for your comments. Please — we have your presentations. If there's anything else you want to submit it to the record will be read and considered. And with that, thank you also to our moderator Rizaldo Aldas for excellent job and we will reconvene at 12:30. So enjoy your lunch.

(Off the record at 11:32 a.m.)

(Back on the record at 12:39 p.m.)

MS. KOROSEC: All right. I think that, even though it's a little thin in the room, we'll go ahead and get started and let people trickle in from lunch as they're finishing up.

So we're going to our second panel on financing and investors and our moderator is Larry Rillera. Larry?

MR. RILLERA: Good afternoon, everyone. My name is Larry Rillera. I'm staff here at the Energy Commission.

Panel number 2 will focus on financing and investment. We will explore the current status of project finance, innovative financing strategies, and creative opportunities to provide capital. The panel will provide

perspective on such issues as Emerging Technology Reverse Auction Mechanism, efficacy insurance, debt financing, incentives, and renewable financing best practices.

What we will do is go around the table first in a couple of minutes to introduce yourself, your organization and then we will go to the phone for some of the other presenters that are here remotely.

Deana, did you want to start us off?

MS. CARILLO: Great. Good afternoon. My name is Deana Carillo and I'm the Manager at CAEATFA. It's a glorious acronym but it's better than the California Alternative Energy and Advanced Transportation Financing Authority, which gets really wordy. So we'll stick with the acronym of CAEATFA.

We're a small state financing agency, housed in the State Treasurer's Office. We are governed by five Board Members: the State Treasurer, the State Controller, the Department of Finance, the California Energy Commission and the Public Utilities Commission.

CAEATFA has a long history from the '80s where we issued a number of different bonds from the Clean Renewable Energy bonds as well as some of the more recent Qualified Energy Conservation Bonds, or QCEBS. And then we went dormant for a little while when the Federal Tax Code changed.

Most recently we have been implementing our SB-71 program where CAEATFA provides a sales and used tax exclusion for green manufacturers. So the manufacturers of the solar panels. The manufacturer of the wind mill, engines and all those components that go to green manufacturing.

That legislation was authorized in 2010 and since then we've approved over 44 applications for private companies. Over $1.1 billion in equipment. Of those 44 applications only 35 are moving forward today. One other interesting thing to note is that the authorizing state statute for SB-71 requires us to do a net benefit of each project to ensure that the sale taxes exclusion lost to the state. That the benefit of the project outweighs that so we actually go through the exercise of quantifying both the fiscal and the environmental benefits of the project. We anticipate that those 44 applications will lead to almost 6,000 jobs in California over the next three years. They have a value of $12.3 million in fiscal benefits and about $22 million in environmental benefits. And that last figure was a little off. So I'll get back to you on that one in case anyone has any questions. But that's a little overview of CAEATFA.

MR. RILLERA: Roma?

MS. CRISTIA-PLANT: Thank you, Larry. I'm Roma

Cristia-Plant. I'm the Assistant Executive Director of the California Infrastructure and Economic Bank. And while we have bank in our name we're not a depository institution. We're actually a statewide financing authority. We're a general purpose financing authority under the auspices of the Governor, and we have a staff of 24. And we have broad statutory authority to provide various kinds of financing such as bonds, loans, loan guarantees, insurances, grants and the ability to leverage state and federal funding.

We have a five member board that approves all of our finances. The Secretary of the Business Transportation and Housing Agency is the chair of our Board. Also on the Board are the Secretary of the State and Consumer Services Agency, the State Treasurer, the Director of the Department of Finance and one Governor Appointee.

Our financings are specifically focused on economic development and the creation and retention of job opportunities while promoting the health, welfare and the safety of the citizens of the state.

Unless otherwise directed our financings are for facilities. Economic development facilities, which are typically privately owned facilities, as well as public development facilities.

Back in 1999 and 2000 the I-Bank was given a net appropriation of about $180 million to fund programs and the bulk of that went into an infrastructure loan program that we had, and I'll talk about in a minute.

We do not rely on any general fund revenues. We're self supporting and we rely on fee income and interest income.

We're also exempt from regulations. The framers of the I-Bank Act wanted the I-Bank to be a nimble financing authority so we produce criteria priority and guidelines or policies and procedures for any programs that we have.

Currently our programs consist of an infrastructure state revolving fund program and we abbreviate that as ISRF and it's a direct low-cost loan program to local governments for a wide variety of public infrastructure, almost anything that you can think of except for housing. And there's already a state financing authority that does housing.

We started in 19 — with the first loans in 2000 with about $162 million in capital. We've issued about $150 million in bonds to leverage that program. And, to date, we've made over $400 million of loans to local governments for public infrastructure.

One category of public infrastructure that can

be financed in that program is called Powering Communications. And that's distribution and we've interpreted that category to also include generation.

The loan program is a middle market, what I consider a middle market program. The local governments have to demonstrate repayment ability so those that cannot demonstrate repayment ability should be looking for the grant funding out there. And then those at the other end of the spectrum who have been in the bond market before and can obtain bond financing on reasonable rates and terms should most likely be back in the bond market again because this is a subsidized loan program.

The underwriting criteria though is slightly more lenient than that approved in the bond market. And the credit criteria was approved by the rating agency before the first loan was ever made.

On the other half of the house we're a what's called a conduit bond issuer, which means that we issue bonds on behalf of someone else. We have the authority to issue tax exempt bonds. Go into the bond market, obtain capital from private investors and then provide that capital over to another entity. One main business loan program that we have on the conduit bond side is the industrial development bond program. We are the only state entity that issues and does true development bonds

and those are bonds up to $10 million for a qualified manufacturing or processing business to purchase buildings or construct buildings and purchase equipment.

We also issue tax exempt conduit bonds for 501(c)3 organizations, usually, typically these organizations are research or cultural oriented and the bond funding is for them to construct their facility so that they can continue to provide their non-profit services.

We also issue bonds for other state entities and we have leveraged the Energy Commission's Energy Conservation Act Revolving Loan Program twice for you in the past. And we've also leveraged a state revolving fund over at the State Water Resources Control Board, the Clean Water State Revolving Fund. That's a U.S. EPA-funded loan program that finances wastewater infrastructure.

We've also issued bonds to finance the east span of the Bay Bridge and we also provide other financings at the request of the legislature such as tobacco securitization.

Lastly, I wanted to just tell you that there is — the Governor's proposal to move the Infrastructure Bank over to the Governor's Office of Business and Economic Development. And this move is anticipated to further provide synergies in assisting businesses and improving

the state's economy.

Thank you.

MR. RILLERA: We have a — oh, excuse me.

CHAIRMAN WEISENMILLER: One of the things that I wanted to — my recollection was that when the utilities did the securitization bonds that at least that was a structure consistent with yours?

MS. CRISTIA-PLANT: Say that again?

CHAIRMAN WEISENMILLER: Well as part of 1890 the utilities issued —

MS. CRISTIA-PLANT: Oh. Yes.

CHAIRMAN WEISENMILLER: Did securitization bonds.

MS. CRISTIA-PLANT: Those were the — Thank you.

CHAIRMAN WEISENMILLER: Okay.

MS. CRISTIA-PLANT: Those were the very first bonds ever issued by the I-Bank and those were the rate reduction bonds. Large amount but that was the very first official bonding activity of the I-Bank. You are correct.

CHAIRMAN WEISENMILLER: Yeah. And so could you describe to us how the securitization worked for those bonds?

MS. CRISTIA-PLANT: You know what? I wasn't with the I-Bank at the time. But what little I know is is that all of us ratepayers paid a special fee on our

utility bill and that was collected to repay those bonds.

CHAIRMAN WEISENMILLER: And so –

MS. CRISTIA-PLANT: That's about all I know.

CHAIRMAN WEISENMILLER: Okay. I was going to say. You might try to get some information – basically, the securitization, I mean, the reason that they did that is because it was a very low cost option and that was a way for the state to get involved and get the cost down. But as you said, it had to have, basically, a dedicated fee associated with that. But certainly, you know, there are other things we might do securitization bonds for other than what we did then.

I guess the other question was my recollection too was that some – the other financing thing some entities have done like the City of San Diego issued two county – basically IDBs under the two county rule, which were then used to finance SDG&E infrastructure, Southwest Powerlink and some other gas distribution system. My recollection was that the two county rule bonds are no longer viable. Is that correct?

MS. CRISTIA-PLANT: You know, I don't know anything about the two county rule bond rule because the I-Bank is a statewide bond issuer and we can issue in projects in several counties. And I don't know that we're subject to that rule.

CHAIRMAN WEISENMILLER: Thanks.

MR. RILLERA: Thank you, Roma. We have a correction to our next presenter in the house. Jesse Jones who is with CleanPath representing Matt Cheney. Go ahead, Jesse.

MR. JONES: Good afternoon. CleanPath is a mezzanine debt development equity and construction equity capital provider to renewable energy projects. We are effectively a development shop. It's the third iteration of a 10-year old energy development and finance platform that was started as an MMA Renewable Ventures transitioned into Fotowatio and then the Fotowatio team came with Matt Cheney the CEO of Fotowatio at the time to form CleanPath. It's about a 2 ½ year old company that raised funds of – a revolving fund of several hundred million dollars to deploy capital into the market.

We will develop projects through to COD. We have several different products that we offer. We do sales to IPPs at COD. We hold projects past the tax advantage period for five years of operations and then sell them on to those people that can't monetize tax as tax equity investor. And for certain projects we will hold them and warehouse them for term.

CleanPath has executed on several large-scale utility projects as well as now, like many developers,

moving to shift to meet the emerging, middle and industrial market, which I'll speak more about as we get into the questions.

MR. RILLERA: Great. Thank you, Jesse.

CHAIRMAN WEISENMILLER: What was the size of the utility scale that you did in terms of dollars?

MR. JONES: In dollars? In terms of dollars?

CHAIRMAN WEISENMILLER: Yeah. I'm just trying to understand —

MR. JONES: It's not done yet.

CHAIRMAN WEISENMILLER: Okay. We're just trying to understand the size —

MR. JONES: Okay.

CHAIRMAN WEISENMILLER: Of what you meant by utility scale.

MR. JONES: The size in terms of dollars? Well, utility scale for us is anything that happens in front of the meter that has a direct revenue contract with one of the utilities. Whether it's municipal or one of the investor-owned utilities.

So typically those take the form of between 5 and 20 megawatt projects here in the state of California. But there are those that we have participated in that are much larger.

CHAIRMAN WEISENMILLER: Okay. Thanks.

MR. RILLERA: Paul Frankel, are you on the phone?

MR. FRANKEL: Can you hear me?

MR. RILLERA: Paul? Are you here?

MR. FRANKEL: I am here.

MR. RILLERA: Paul. Welcome.

MR. FRANKEL: Yes. I am. Thank you. Thank you for having me and inviting me to participate in this meeting. I'll just take a couple of moments and introduce CalCEF.

We are a fund of funds that has a very unique origin. Some of the folks in the audience may be familiar with our work and story. We were actually created as a condition of the bankruptcy organization of PG&E back in 2001 or so.

The CalCEF officially formed in 2004 with a directed corporate grant from PG&E shareholder money and we have a $30 million corpus that we use to actually invest in clean energy market expansion and the acceleration of two clean energy technologies in California.

We do that by a product development analysis and research method. We look at underserved high potential impact, high potential profit segments of clean energy markets. We try to understand at a very granular level

what is preventing capital from potentially flowing into those markets, commensurate with the opportunity and we were first mover to actually create new implementation vehicles that solved those problems and put our money on the table first so that we can entice other private capital participants to participate alongside us and solve these problems.

We've done this a few times looking at the need for mainstream investment from the venture capital community into clean energy technologies as an asset class. That happened back in 2005 when we made our initial investments. In 2007 we actually created a De Novo fund that is a separate for profit venture, capital firm that's focused on feed stage investment called the CalCEF Clean Energy Angel Fund.

And we're currently in the process of developing some new funds around the area of tax equity for large renewable generation projects and energy efficiency financing.

We are a completely independent entity. We're not part of the state government. We're not part of PG&E. We are a combination of both a 501(c)3 and a 501(c)4. Although, as I mentioned before, we are an investment shop as well, which means that just because we're a non-profit organization doesn't mean that we don't try to generate

profit. It just means that we don't try to distribute our profits because we don't have any shareholders or any managing members.

But we like to think of ourselves as kind of the connective tissue between the marketplace and the policy place and happy to contribute what we can here to this conversation.

MR. RILLERA: Great. Thank you, Paul. Seth Miller from DBL Investors. Seth? Are you on the line?

MR. MILLER: Yes. Hi.

MR. RILLERA: Great.

MR. MILLER: Yes. I am on the line. I'm a partner at DBL Investors. We're a venture capital fund based in San Francisco with about $225 in our management.

We invest in a number of different sectors but of the 29 investment we've done to date since 2004, 12 of those are in what would be considered cleantech investment. And that's been anything from utility scale, power generation to residential or distributed power generation, wind advanced storage, electric cars and biochemicals.

A number of our companies have taken advantage of creative financing for the cleantech space. And we are definitely big proponents of this type of creative thinking because it's important to help the type of

companies we invest in push the envelope of technologies that will help us solve these problems find cheaper energy with cleaner impact and help create jobs in America, and help us keep leadership position in industries that we've created.

MR. RILLERA: Great. Thank you, Seth. John Marciano, are you on the line? John?

MR. MARCIANO: I am. I am.

MR. RILLERA: Great. Welcome.

MR. MARCIANO: Hello. My name's John Marciano. I'm with Chadbourne and Parke. We're a 109 year old law firm based, I guess, originating from New York City but I'm in Washington D.C.

We focus a lot of our energy on the independent power industry. We have 80 lawyers that do that. We're primarily, if not exclusively. We were one of the pioneers in opening up the U.S. independent power industry by taking a number of cases to the Supreme Court and then litigating a couple over 20 states to, essentially, allow independent power to flourish in the '80s.

What we do today is focus about ¾ of our time on renewable energy as the wave of renewables move forward. We're on 17 of 18 large scale utility deals last year.

We financed over $20 billion in projects in some capacity. We're always happy to assist in trying to bring

in more individuals or companies or entities to the table in terms of financing or development or however we can help. So happy to be here.

MR. RILLERA: Great. Thank you, John.

CHAIRMAN WEISENMILLER: John, this is Bob Weisenmiller. Thanks for participating today.

MR. MARCIANO: Sure.

CHAIRMAN WEISENMILLER: I guess the thing that I just wanted to swing back on. The deals you were involved in last year to try to get a sense of the typical in terms of size, the technology and where the money was coming from.

MR. MARCIANO: Right. I can't say that there's a typical deal in terms of size because we were on deals as small as, probably, 10 kilowatts in terms of the small residential distributed solar deals all the way up to $3 billion solar funds or wind funds so it's really all over the place.

I would have to say though that the technology is focused almost exclusively on solar and wind. Geothermal, biomass, fuel cells. Those technologies are all doing very well but they're, at the moment, a much smaller component of the overall renewables industry.

CHAIRMAN WEISENMILLER: And at this point in terms of the investors, you know. Over time these sorts

of things –

MR. MARCIANO: Sure.

CHAIRMAN WEISENMILLER: Bounce around from the Japanese banks to the European banks – anyway, I'm trying to understand who's in the market at this stage.

MR. MARCIANO: Sure. So traditionally the renewable power projects have been financed through tech equity investors since a lot of the projects benefit from federal tax incentives and those investors are typically investment banks, pension funds or not so much recently but pension funds in the distant past, insurance companies. Almost all of them are domestic although we've seen a lot more activity from Japanese banks with U.S. presence. From some European banks with U.S. presence although over the last couple of months they've pulled back a bit.

We're always trying to find new investors. This year we've seen a number of new corporate investors come into those markets. Google, for one, has been very active.

CHAIRMAN WEISENMILLER: Any pension funds involved?

MR. MARCIANO: There are. They're not typically involved in the investment of projects. They typically invest higher up in the ownership chain at the developer

level as cash equity.

CHAIRMAN WEISENMILLER: Okay. And one of the things that people are talking about this morning is sort of the bond market or at least trying to compare the scale. And, obviously, we've got tens of billions as opposed to the – and trying to figure out how to crack the bond market. And talking about when the rating agency moved in and the 144A's were used but in terms of it at this point I'm assumed that the technology risk is such that the bond markets and rating agencies are in a not in the solar wind space?

MR. MARCIANO: Not at the moment. There's been a lot of talk about securitizations of solar assets and there's a big push to get the rating agencies to come in and do a rating so we can do those securitizations.

Everyone in the market that I've talked to in terms of securitization players and other industries have been saying that we're playing a year or two off. But it is looking like distributed solar will move into a securitization type setting.

CHAIRMAN WEISENMILLER: Okay. And it sounds like part of what you're doing even at the 10 kilowatts is helping some of the entities finance, I'm going to say, residential or at least small scale solar?

MR. MARCIANO: Yeah. If you have a small solar

project it's typically wrapped up in a larger fund.

CHAIRMAN WEISENMILLER: Right.

MR. MARCIANO: Those small projects need to be pushed into a fund if you want to get a tax equity investor interested that's probably at least $10 million worth of investment from the investor. More typical though is $50-$100 million and we're seeing some funds recently as much as $200 million. And it really goes to show that the renewables, at least in the West, distributed solar is really catching on with homeowners. They're getting very into it and some of our clients are signing up 1,000 plus contracts a month.

CHAIRMAN WEISENMILLER: And, you know, I know – I guess at one point (indiscernible) was looking a lot too at the biofuels area on the financings there. What's going on in that area? This may be one of your partner's –

MR. MARCIANO: Yeah.

CHAIRMAN WEISENMILLER: If anything.

MR. MARCIANO: Biofuels were very hot in 2006-2007 and a little bit of 2008. As natural gas prices came down and as the oil prices came down it really tanked. At the same time those prices came down, corn prices went up.

CHAIRMAN WEISENMILLER: Right.

MR. MARCIANO: We've never really been able to

capitalize on the cellulosic biofuel market. A lot of our clients that we've been working with have struggled to put those projects online. Although, there are a few that are in the works and at least one of them is working with the DOE on a loan guarantee.

CHAIRMAN WEISENMILLER: Yeah. We've been sort of dealing with — as you know, because you're right, those projects tended to, as prices change, go into bankruptcy and try to come out in this stage.

MR. MARCIANO: Right. One of the problems that you find with them is that you don't have long-term off take contracts like you do with electricity.

CHAIRMAN WEISENMILLER: Right.

MR. MARCIANO: Because with electricity you could find an off take contract for 20 years with a good off taker. You might get one for a year but biofuels. You might talk to the military and they have a set number of gallons they need for a year or two years.

That doesn't get you enough to push your project across the line in a lot of cases. Coupled with that is the tax credit center available for those projects. They sunset every year so you don't have any consistency. You can't have a tax equity investor come in thinking they'll put in a large chunk of change today with a guarantee of getting tax credits over the next few years because you

just don't know that they'll be there.

CHAIRMAN WEISENMILLER: So, I guess, basically it's (indiscernible) in monetizing the losses from before.

MR. MARCIANO: Yeah.

CHAIRMAN WEISENMILLER: Yeah. This thing struck me as hard, as you may remember, in the cogen side we have gas and power and unless you can figure out something you can get killed pretty quickly from the two moving in different directions.

It seemed endemic to here is that you can't build any sort of spark spread kind of structure that guarantees your profitability over time.

MR. MARCIANO: Right. You see a little bit of that with the SREC Market. Even with electricity.

CHAIRMAN WEISENMILLER: Yeah. What about, I mean – I guess the other thing people are looking at as a potential large market would be energy efficiency retrofits. And that's probably much more in the CPUC court as they try to deal with the financing at this stage. But my impression is certainly there's some interest at the financial markets and trying to provide the capital for that.

MR. MARCIANO: We've done a couple deals with energy efficient improvements for street lamps in a couple of municipalities. Mostly with lighting it seems.

CHAIRMAN WEISENMILLER: Okay.

MR. MARCIANO: Not so much with heat recently.

CHAIRMAN WEISENMILLER: Right. So it'd be interesting because obviously we're trying to move forward on an LED rollout so lots of opportunities there for change.

COMMISSIONER PETERMAN: Hello. This is Commissioner Peterman. Can you speak to the challenges you're seeing with the SRECS market? Just elaborate on that point.

MR. MARCIANO: Sure. I almost caught myself when I said it, I should have said SRECs markets. There's multiple markets. Each state has their own. The ones that are most hot at the moment or the last few years have been New Jersey and Massachusetts.

New Jersey's SREC is on the spot market were trading at $600 + per SREC just two years ago and now they're down under $100. The difference in cash flow to projects is just striking. A lot of the projects that we were working on almost didn't even need to sell power because the SRECs were so valuable.

So people are having to actually go back to the basics, at least in New Jersey and think about how their projects pencil without the SRECs or without a guarantee of the SRECs.

There are no long-term contracts of any merit; you can get them with aggregators that don't really have the balance sheet to stand behind them on the long term. Massachusetts is much higher recently. Their prices are higher. They have sort of a floor on their SRECs so that investors and lenders can get semi-comfortable with what the pricing downside might be, although if not people call it a soft floor. It's not so fixed.

It's really hard to get investors or lenders to come into a deal with the promise of SRECs unless you do have a really tight floor on what the price might be.

COMMISSIONER PETERMAN: And is the situation in New Jersey that they just had over supply over the last of years or more supply?

MR. MARCIANO: That's right. It was too successful.

COMMISSIONER PETERMAN: Okay. I can't recall exactly how that policy is structured in New Jersey. Is it a percentage of RECs needed for RPS compliance annually or is it a set megawatt target for solar?

MR. MARCIANO: It's annual. Each utility has a certain amount of renewable energy that it needs to have in its portfolio each year.

COMMISSIONER PETERMAN: Okay.

MR. MARCIANO: It shows that by providing SRECs

to really just a certificate that shows one megawatt hour of renewable energy was produced.

COMMISSIONER PETERMAN: Thanks.

MR. MARCIANO: Yep.

CHAIRMAN WEISENMILLER: What about greenhouse gas emissions? Or cap and trade programs? How is that factoring in, if at all?

MR. MARCIANO: I haven't seen it factor in at all, yet. Except to the extent that certain people are trying to qualify for the federal tax incentives for securitization of carbon — carbon dioxide. Those programs are not really operating as efficiently as they could. There's a couple of items of uncertainty as to how you could qualify for them that are holding the industry back. As far as cap and trade, that whole issue seems to be essentially dead for the moment at the hill. That's what we're hearing from the members that we talked to.

CHAIRMAN WEISENMILLER: What's your sense — what's the current prognosis on the production tax credit? Or extension or any type of —

MR. MARCIANO: Right. So the Production Tax Credit we're hearing somewhere above 50 percent changes of an extension. It won't happen before the election. It might happen before the end of the year in a lame duck session but it really depends on whether the Republicans

can do well in the electric. If they don't do very well they won't have any incentive to come and do a lame duck session where they can come together and actually pass something. The wind industry that we work heavily with has slowed down slightly. I was just at the AWEA Conference, the American Wind Energy Association Conference in Atlanta in Monday. I was told that the turnout was a little bit less than last year. It's some like 60-70 percent of the turnout from last year. So there's a little bit of – I guess people are not that optimistic but they're still out there. They're still trying to get deals done.

CHAIRMAN WEISENMILLER: Right. Thank you.

MR. MARCIANO: Thank you.

MR. RILLERA: Thank you, John. I think what we'll do is turn our attention to the questions.

The first question what is the current status of project finance for renewable technologies? Discuss boom/bust finance cycles and how the capital markets are responding.

Jesse? Please.

MR. JONES: Sure. Well, it's a bust right now, right? So I guess it depends on how do you define bust? If you're looking at the large-scale utility market, big, renewable energy projects, then I'd say yes. As stated

before in the DG market things are doing well, Specifically in California. But there are some technical limits to what can be accomplished there. Both financially and physically from a risk perspective and from whom can apply for and get financing for projects on their homes.

The way that — how our capital markets are responding. I think capital markets are looking to see what products come forward from developers or policy makers so that they can find a place to invest.

In California, and maybe I'm jumping ahead, but in California, we see on-bill financing, PACE financing and virtual net metering, which is SBA 43 which is the Wolk Bill sponsored that CleanPath has sponsored.

All three of those are mechanisms that kind of open up the middle market, which has been, we feel, the largest opportunity for growth and serves the needs of the consumer more than a lot of the other large scale renewable projects that are founded in RPS. When you look at what I call not DG but industrial applications for renewable energy. And we look at energy savings, power saving and demand response. There are direct and immediate benefits that you get in that market. The problem is is that there's really difficult to underwrite to the middle market, to the commercial market because of

the credit risk associated with it.

When we look at PACE financing or virtual net metering, virtual net metering is effectively decoupling the source of energy from the host facility and being able to build what would typically be utility scale plants scale but having multiple investors buy in over the existing utility grid, making energy fundable and having those contracts be liquid so that one person could come in and out of a contract if they choose to move them forward and/or they could sell the rights of a contract or move that contract from one facility to another if their business moves.

We see that as a solution and those types of programs are popping up in numerous states. There's one that exists in Massachusetts, which is finding a difficult time getting third party finance investors because it's got a floating rate. There's no floor. There's no fixed rate to it.

And then in Colorado it's being offered by Xcel in what is a true community solar structure or virtual net metering structure but the incentives are still for much smaller projects so and the caps are small for the program. So the scale isn't being realized.

So I think that for something like on-bill financing for energy efficiency, I think that the

financing capital markets will respond well it's just that the adoption from the consumer has been slow. I think that people are a little bit gun-shy for hearing that things are just going to provide them huge savings for years and years and years now and there hasn't been a lot of proof to that. And especially when financing in capital markets are offering it. But I think that is a good program. That is a good policy to move forward. PACE financing has gotten some legs in the commercial space and middle market. And we've seen a few projects financed. I think everybody understands what PACE financing is in the crowd. If not, it's a means to effectively underwrite to the property value of the site rather than to the credit risk of the host. The increase that you pay from the loan you may get from the municipality, the payback is through an increase in your property tax.

So if the underwriter could look to a variable increase in the property tax they know that over term they're always going to receive compensation, whether or not that house goes into foreclosure or that business goes away, whether the bank owns the note or another person does. They always have to pay their property taxes. So Ben Franklin, right? The only thing certain is death and taxes. So if you could underwrite to the tax on the

property then you could meet the middle market.

So I'd say the way that the capital markets are responding is that they're really trying to find an opportunity to invest. When you look at renewables globally and here in the United States, this behind the meter industrial DG market really does offer the most opportunity for growth as consumers and ratepayers and utilities meet their RPS and actually, you know, just looking at probability analysis of a P80 or even a P70. They're much in excess of the RPS in many states, again, having a too — often times maybe a too successful program.

So I'd say that's my take on it.

CHAIRMAN WEISENMILLER: Yeah. Do you have any sense of what the default rates are on on-bill financing? Obviously there's the public sector and the non-public sector. So trying to understand the private sector default rates.

MR. JONES: I don't. I mean right now less than one percent of all consumers participate. So you'd be talking about the default, the percentage of one percent, and I'm not aware of what it is right now.

MR. MARCIANO: Are we talking about distributed solar when we're talking about the default rate?

CHAIRMAN WEISENMILLER: Yes.

MR. MARCIANO: From the discussions that I've

had with our distributed solar clients it's almost 0 default rates because the last thing people want before they — almost before they move out of their house in a foreclosure is to turn the lights off.

MR. JONES: I would say the caveat to that is most people can get distributed solar unless they have a FICO score of 800 and a south facing — I mean the technical limitations to who can achieve a residential scale solar system on their house is self-limiting. So the reason that you don't have a lot of default — I thought we were talking about energy efficiency. The reason you don't have a default in the residential solar space very often is you need near perfect credit to participate.

MR. DAY: Michael Day, Rockwood Consulting —

MR. MARCIANO: So 7-730 is the minimum, yeah.

MR. DAY: Michael Day, Rockwood Consulting. On March 23, SMUD held a workshop where there was actually some Commission staff there and they talked about their experience operating an off-bill finance program, secured by UCC-1 Fixture filing. They're run their program for 40 years. They've had close to a 100,000 individual loans go through. Their loss rate, as they define it, is under 4 percent of the total amount loaned. However, their definition is any loan that goes 30 days late they send to

the bad bank. When you really look under the hood and start looking at the numbers their effective loss rate of all the money loaned has been less than 1 percent over a 40 year history. So that's several business cycles and that information was passed over to the Commission on the 23 of March.

CHAIRMAN WEISENMILLER: That's good. Now I was going to say I know for PG&E had a couple of programs like this. One in the 90s for residential energy efficiency where the – basically the bad debt became the shareholder's obligation so they got out of that program.

They had a pilot program during that for solar but, again, that's where the asset is pretty tangible. If, you know, they felt pretty comfortable they had to they could take the asset and resell it. But, again, that was pretty small program.

COMMISSIONER PETERMAN: It would be good to hear from John or Paul on this question as well. You've discussed a bit some of the boom bust finance cycles but if you have anything else to add.

MR. FRANKEL: Sure. This is Paul Frankel. Love to chime in here. And, on this question of default rates, you may have seen a report in December of last year by the ACEEE that talked about performance of on-bill financing. It says Repay – the title of the study is "Repayment for

Energy Efficiency Improvements through Utility Bills is a Growing Trend." They quote a default rate of "frequently less than 2 percent."

So I have — I do not have the report opened in front of me but I believe they — this was a national wide study so I'm happy to send along that link.

CHAIRMAN WEISENMILLER: That would be great.

MR. FRANKEL: We too at CalCEF — Happy to do that. We too at CalCEF are looking at energy efficiency projects specifically and I want to echo a lot of what Jesse, I believe who was the last speaker, was saying. But I also want to draw out a couple of other important points.

One is that we have a need to segment to market in a very way, I believe, because different products are going to meet the needs of different customer segments so it's not useful to talk about energy efficiency financing as some monolithic thing.

The problems that residential customers have are different from the problems that large industrial owner occupied facility's have, which are different from large multi-tenant commercial buildings. And so what we've been doing quite a while here. And CalCEF is looking at options to reduce first cost hurdles for adoption of energy efficiency technologies. And we think debt is one

way to go about that or leases is another way to go about it but we also believe that, as the previous speakers mentioned, those products are problematic because a lot of times — well, you have two issues. One is the credit quality of the customer and the second is the actual energy performance of the technologies that are installed. The savings performance.

And so what happens in a typical ESCO model is that they A) only deal with extremely high credit quality customers or even if their lower credit quality they know the municipal or other type of government entity is going to be around for a really long time, beyond the term of the contract for the efficiency services.

And number two they only deal with technologies that they can model and, in fact, provide a savings guarantee for the customer. So if the savings that were supposed to have materialized from the installation by the ESCO do not materialize then the ESCO will pay the customer for those savings. Because of some technical error in the installation or because of some technical error in the technology itself. Some performance error by the manufacturer.

So what's important than, in order to meet the needs of a lot of customers is A) that they need to be able to qualify for credit and B) there needs to be some

entity that stands behind the savings opportunity. And, in order to do that, it's very difficult because as was — again, because as was mentioned the middle market is where we believe there's at least $14 billion a year of annual savings opportunity in this country.

So if you look at specifically owner-occupied buildings for commercial, industrial and institutional applications and you assume a fairly conservative of 20 percent savings opportunity in those buildings using CBECs and MECs data from the Department of Energy and projecting forward from the last known good data set we believe that there's about a $14 billion savings opportunity annually.

So how do you get at that? Not all of those customers are going to be able to use their balance sheets to finance those projects. And, of course, there's a massive opportunity cost versus operational priorities that those organizations have. And so oftentimes efficiency projects are just under the line. They don't make it through the budgeting process.

Secondly, those same organizations probably don't want to use some sort of liability based mechanisms so the leases and the loans they're marginally attractive but again it's an obligation on their balance sheet that they don't necessarily want to take on. And, especially for the more small and medium enterprises, they don't want

to take that on.

So what we've been — ob-bill financing and PACE are attractive mechanisms and I'm going to come back to that in a second and say why but we've been looking at services based models. So just like a solar power purchase agreement or an efficiency services agreement can do the same thing. Meaning that if a customer wants to get a benefit of solar production on — from panels on their roof but they don't want to actually make the initial investment required to purchase that asset or to take on a liability to purchase that asset there are third-party vendors that are financers who are financers who will actually buy and own those assets and place them on the roof. And the customer simply pays for the output generated by those assets.

In the case of solar, the output is electricity but in the case of efficiency you could say the output is energy savings or megawatts and so we believe that this model of providing efficiency services is essentially selling efficiency as a utility would sell a electricity to customers and doing so in a services based contracts actually removes a lot of the upfront cost barriers associated with both the demand side of the equation, again the budgeting and the liability issue, but also the supply side. So for the small and medium enterprise

market you don’t see a lot of lenders willing to make those kinds of deals because of the credit risk and because of their unfamiliarity of these types of technologies and projects.

And, secondarily, ESCO’s savings guarantees don’t exist for the small, medium enterprise market because they will not service any projects that are less than $1 or $2 million. So we think that in terms of project financing and in terms of energy efficiency a services aspect is — a services model is really a very interesting proposition.

The on-bill financing is complementary and so is PACE and so PACE is a way of actually raising additional funds that are — especially for the small, medium enterprise market low enough cost that you can absorb some transaction cost for the smaller entities. Of course, it does need to be done in a programmatic type of way because evaluating — doing a deep dive on every single customer credit is going to be extremely costly but if we can use the PACE conduit to raise lower cost capital from the capital markets that actually could make a lot of sense.

And, secondarily, the on-bill retainment conduit adds an additional element of security by adding the threat of shut off of services to the customer and so I want to emphasize an efficiency services type of model is,

in fact, complimentary to PACE and on-bill approaches as well.

COMMISSIONER PETERMAN: Great. Thanks, John.

MR. FRANKEL: Sure. That was Paul Frankel from CalCEF.

COMMISSIONER PETERMAN: Right. But thank you, Paul. John, do you have any comments?

MR. MARCIANO: Yeah. I view these not so much as boom bust but as a series of waves and you can see the waves coming for a few years and then getting closer to the shore.

We saw that with low income housing and historic tax credits, people flooding into those markets as the markets get very crowded people start looking for others as new incentives come in. And you saw that in 2008/2009 after the crash at the end of 2008 when the stimulus bill came in in early 2009 there was a flood into renewable electricity.

I really just see the projects that people are trying to finance as an exercise in trying to complete a puzzle. And you have six different pieces to complete that puzzle. You have different pieces of capital that are, essentially, cheaper or more expensive. So you start with grants, they're free. You have debt that's guaranteed. You have debt that's not guaranteed. You

have tax equity types of investment. You have strategic equity and then you have just straight equity.

Now depending on who you're dealing with one or more of those puzzle pieces may be gone and you may have to make a bigger piece from one of the others. So if you're talking about a homeowner, well, maybe they only have debt or PACE, which PACE is really a form of debt. If you're talking about a large windfarm, for example, a couple of the puzzle pieces are going away in the near term. The Production Tax Credit will pull away. The tax equity market, the treasure cash current is going away. Guaranteed debt is only available, essentially, through the Department of Agriculture at the moment for new projects so what does that leave them?

They have straight debt; they have a modicum of tax equity if they can monetize some depreciation. They have strategic equity and straight equity. We see a lot of straight equity plays that people are talking about. The biggest one of the moment is whether people can move REITs into the market or mass unlimited partnerships.

REITs are a way of raising straight equity at a lower cost, almost akin to raising debt but it's just equity because you looked at the public markets.

So going — moving to whether we have a bust on the horizon I think it really is just going to be a

question of where are the opportunities coming and where's the next wave? And if the wind wave is nearing the shore maybe we fall back on that wave and join up on the solar wave. And we see that with a lot of the development companies that are wind focused, shifting gears slightly to be able to develop solar projects as well or fuel cells or biomass so I think there are opportunities. Capital goes where it's needed and it seems to be finding a place in various aspects of the renewable sector regardless of the fact that some of the incentives are coming in and going away.

COMMISSIONER PETERMAN: John, thank you for that. As you're speaking I appreciate the perspective that you're bringing about how inspectors should choose what to invest in. As a state we're focused on having a diversified portfolio and so we do have some concerns about focusing on any one particular technology at a given time but acknowledging that sometimes that's where the interests directs one.

And I think you've touched upon question three here about the opportunities – the financing opportunities that are starting to expire and when we get to that question to hear your thoughts further about what can be replaced.

Larry, as you move into question two I would

just say that I think Deana and Roma both touched upon, and I know Roma has something to say, on what traditional public finance entities can provide. And, as you go to answer that question, I'd appreciate you focusing on what types of projects are not necessarily getting financed right now by traditional public entities. Maybe that's distributed generation or smaller scale. Maybe that's things that don't have physical facilities. So I'd appreciate you touching upon that.

MR. RILLERA: Okay. Thank you, Commissioner. Maybe we can move into question two then, Roma.

MS. CRISTIA-PLANT: Okay. I will do that. I did want to add just a little bit on question one and I know there's been a lot of discussion on that.

I'll be real brief.

COMMISSIONER PETERMAN: Take your time.

MS. CRISTIA-PLANT: In general, and you've probably already heard this before, the bond market itself, you know, is in some respects a bust cycle because we've lost bond insurance. We don't have that anymore. I mean, it's rare out there. It's there but it's very rare. And the other aspect or the other kind of credit enhancements that isn't there in the way it was in the past is letter of credits. And between bond insurance and letter of credits that's how bond market financing was

accessed in the past. So those are gone.

The other issue I wanted to bring up though is that government borrowers, in general, their budgets are strapped. Especially what we're seeing is that government borrowers that provide utilities, and not necessarily energy to utilities, but water, sewer, basic backbone services, they're in a position of not wanting to raise rates or not being able to raise rates to even finance the maintenance and operation of their existing facility.

What we are seeing is several local governments coming to talk to us to figure out ways to install renewable energy projects so that this cost savings can then be factored into their utility budgets and they can continue to operate and provide those basic backbone services. Nobody's moving yet but we're hearing some talk of that.

So I just wanted to mention those two things right now.

COMMISSIONER PETERMAN: Thank you. I think that's a particularly useful point to mention considering the discussion we had on panel one about bond market opportunities and be providing some insight about just the bust in that general cycle outside of the clean energy space is important.

MS. CARILLO: And I would just add to that –

MR. FRANKEL: Go ahead.

MS. CARILLO: I would just add to that as far as what kind of existing policies or policies can we expand on. You know, at the State Treasurer's Office and the I-Bank too we're conduit bond issuers for private activities. So to whatever extent we can encourage that kind of private activity I think at the federal level it would be fabulous if there was some real movement at the federal legislation to add tax exempt bond financing for renewables.

Senator Feinstein has had a bill in the past. I couldn't tell you where it is in the process today. I think it is nonexistent. But I think from a federal level as a federal policy that would be a great aid to the state and our projects here.

MS. CRISTIA-PLANT: And getting on to question number two, what I wanted to add was that I heard this morning about small hydro projects being at $1 million and it's hard to access the bond market in those amounts. I just wanted to let you know that the I-Bank can consider some pooled bond financing. They are a little bit more difficult to put together because you try to look at some uniformity in credit or you need some sort of credit enhancement but those projects could potentially access the bond market if they could be pooled together and the

I-Bank has that authority.

COMMISSIONER PETERMAN: There was a comment on the phone.

MR. FRANKEL: Hi. Yeah. This is Paul Frankel again with CalCEF.

Kind of bridging question one and question two here I did want to mention a couple of efforts that we have underway. One is in conjunction with a group, another nonprofit, called SolarTech, we, in fact, have calls out to the rating agencies and project developers and other financers looking at this question of how, in fact, do they evaluate project performance and the order two is yes, there is a technology risk but the question is how do they actually measure that risk and is there enough performance information so that they can create actuarial on payouts for any claims. And so this is true for both, I should say, the insurance market but that same underwriting process in terms of performance of assets is applicable for the securitization process.

So we are in the process of right now of engaging in conversation with insurance underwriters as well as securitization underwriters and the rating agencies themselves.

The other side of that coin is actually collecting performance information from assets that are

performing in the field. So one area that the state could, potentially, play a role is in creating some sort of database repository for information to be a basis for the evaluation of assets and projects. And it's not just the individual components of a technology that need to be evaluated but the performance of a whole system that needs to be evaluated. And we wrote a white paper on this. I'm happy, again, to forward it around to members of the Commission and there is something there in terms of both a data standard or a reporting standard and, in fact, a location to house this information and make it accessible to financial institutions.

Two other quick points. One is that we're also doing a bunch of work on looking at REITs and, specifically, for solar and wind assets. Understanding how REITs could potentially play a role. And, obviously, there's a big federal aspect to that but we're actively pursuing those activities right now. And, again, we welcome engaging conversation on that topic.

Last comment for the moment, I think it's worthwhile to note that there are a variety of different incentives provided to renewable energy technologies that are not available to energy efficiency technologies.

So there is some federal effort underway right now looking at the IRS tax code. Specifically, section

179(d) of the tax code where there's, right now, a fairly limited opportunity for energy efficiency product developers and installers and architects to actually take a deduction for energy efficiency technologies.

I realize fiscally this may not be a popular option at the moment but it is worth noting that there are very few, if any, tax deductions at the state level in addition to the federal level for energy efficiency implementations. So that may be an additional area to look into it.

COMMISSIONER PETERMAN: Thanks. If you wouldn't mind, again, submitting into the record that white paper you wrote on performance standards that'd be great.

MR. FRANKEL: Great. Will do.

MR. RILLERA: Paul, this is Larry. I wanted to clarify. Is that your June 2010 whitepaper?

MR. FRANKEL: I believe it was from last year, Larry. Let me do a quick —

MR. RILLERA: That's fine.

MR. FRANKEL: Search. I believe the name or the title of the paper is called, "Insuring Innovation."

MR. RILLERA: Yes. That was last year. With respect to the June 2010 whitepaper you had issued, one of the points of conversation this morning was regarding efficacy insurance and you had just mentioned some

insurance project or product potentially. Could you elaborate a little bit on efficacy insurance and the use in renewable financing?

MR. FRANKEL: Sure. And that would be, I think, that there are two papers that we wrote. One was kind of setting the playing field, if you will, and then we did a much deeper dive specifically into insurance products and that was in — published in October of 2011. And so it's called, "Insuring Innovation: Reducing the Cost of Performance Risk for Projects Employing Emerging Technologies."

And the idea there is, again, there are component warranties and component performance policies out there available from insurance providers. But those are insufficient in order to reduce the cost of capital and make capital more accessible for technologies that have not yet been field proven or have not yet been proven to the degree that they need to be in order to be considered mature by the mainstream debt providers.

So you can finance these projects but it's extremely expensive. It's expensive to do it with equity. You can, sometimes, from very limited number of insurers actually get some sort of system performance insurance but it's not cost-effective for the developer. And so in addition to a power purchase agreement, some long-term off

take agreement, insuring the performance of the assets is critical to actually getting low-cost capital. Enough so that it makes it a profitable endeavor for the developer.

And this question of how to get that performance tail recorded for technologies that are being built at a commercial scale for the first handful of times is obviously critical to allowing many technologies to flourish in the marketplace, to meeting our overall renewable energy efficiency and carbon goals. And this is one of those valleys of death that we hear about so often but it's just not talked about as much. We hear a lot about demonstration scale financing but we would submit that first commercial project financing for emerging technologies is an equally critical gap and if we want these technologies to actually scale up to any meaningful volume then this is a problem that we need to address.

COMMISSIONER PETERMAN: This is Commissioner — go ahead.

MR. MILLER: This is Seth. Sorry.

COMMISSIONER PETERMAN: Go ahead. Make your follow up point. Go ahead.

MR. MILLER: I'm sorry. This is another voice. This is Seth from DBL Investors and I just wanted to follow on from that from a venture perspective. I think that's a fantastic point. You know we'd seen the number

of venture dollars go down in the past quarter about 20 percent and it's still over $1.5 billion but down from, you know, well $2 billion. So a significant drop.

So it's kind of a bust and the capital markets, in terms of exits being a lot less likely, that's also driving venture investors away from the sector. And to helping companies come through this Valley of Death with things like insurance — efficacy insurance or, potentially, solar REITs or, you know, structures that look like feed-in tariffs will be critical. Especially in the area of first commercial deployment or, you know, a little bit later on even for a second, third, fourth, you know, until things get understood well enough out in the field that more traditional lenders will be willing to come in and take care of that.

We've had one of the large insurances companies approached one of our companies that's doing sort of midscale solar project development and talked to them about doing an efficacy structure with them, which would be incredibly helpful in driving the interest rates down and what people can do for project development. It's definitely critical so that kind of thinking and these kinds of policies, things that encourage this would be crucial to encouraging the growth of venture investment in the space again at a time when we're losing investment in

the space and helping these companies get through the different various types of valleys of death.

COMMISSIONER PETERMAN: I'll just –

MR. MILLER: Sorry.

COMMISSIONER PETERMAN: I'll just note that –

MR. FRANKEL: Seth, thank you for that endorsement.

COMMISSIONER PETERMAN: I'll just note that in the PIER program at the Commission we've done some of that first commercial financing but it is one off on a project scale and it's not at the total size that is really needed in the market.

So I wanted to turn to Roma and Deana. Roma, listened to some of your comments, you noted that some of the loans that are available through the I-Bank require parties to be able to demonstrate that they can repay the loans. So are there opportunities within your current financing structures to do some of this first commercialization financings and this higher risk potentially financing?

MS. CRISTIA-PLANT: Not with the resources that we have now. If there can be a source of funding that could be provided the I-Bank could certainly generate a program that could generate something like that.

MS. CARILLO: And for CAEATFA we're in a little

bit of a different situation because for our renewable projects we're providing a sales and used tax exclusion. So the applicants really have to have the capital to buy the equipment to even benefit from our program. We're the last dollar in.

We're technology neutral. Many of our projects that we've awarded, you know, haven't been able to pull together the funding and so have not moved forward. So in that case, well the state's risk of providing that assistance we can fund some of those early commercial projects but they have to be able to come up with the capital first.

Under our other — the other program that we're launching right now we're providing some financial assistance to financial institutions to encourage them to provide loans for residential energy efficiency retrofits. It's a little — it's related to the conversation today but a little off topic and isn't relevant to that specific point but we are providing some financing there as well.

MR. RILLERA: Okay. Great. Thank you. How about we move to question number three.

The effects of the 2008 financial crisis — excuse me, financial markets helped to create many federal policies and investments such as the cash grants (1603), loan guarantees (1703 and 1705) and others. As these

programs and others sunset, provide recommendations on what assistance California can provide going forward.

MR. JONES: So I have a little bit of a vested interest in this one because we are sponsoring state legislation right now.

I'll speak first. We all need to think about a post-ITC world, not just from state incentives but from federal incentives. The time will come. Government builds up industries by providing tax shelters and other than a few lucky ones those tax shelters oftentimes go away.

So I just got an email from our Director of Policy at CleanPath that Vote Solar just published a report for SB-843 so I guess the first thing would be sound policy. And back up and say that in Germany, which has a feed-in tariff that may be too rich, but they were able to install 1.8 gigawatts of solar electricity in 90 days. That is 57 percent of the United States' Army for the next 13 years and that's just what sound policy can do for homeowners. German moms and dads.

So the SB-843, which is virtual net metering, is a means, I think, to help create what is a post-ITC landscape.

We see that – per this report it would allow 12,000 direct and introduce local jobs, $230 million in

local tax revenues and $7.5 billion in total economic output. This is published by Vote Solar and I'd be happy to forward it over at the end of the meeting.

So I think that it is – in a way 1603 was what the market needed to kind of spur the growth that will then create a resilient industry in its wake. The cash grant was essential for that but now as it goes away, and when we look at the paralysis in Washington and as I get older I wonder if it's ever been any different. Maybe you guys can tell me. But as I get older I wonder if it's ever been any different and when we go – I spend a lot of time in Washington working with the military and their different programs. And it seems to me what they're looking to, and what the folks in Washington are looking to, are for people at the state level to make policy initiatives that foster growth after the ITC.

So what California can do going forward is to pass SB-843. That's the last plug for that. But, you know, foster sound policy on the state level and not depend on anything to come out of federal government, I think, is probably key.

And you can use North Carolina as an example. Very cheap, a blend of retail rate of power. There has been a lot of activity in the solar space, specifically in North Carolina. I'm seeing projects come out of there at

a faster rate. They're investor quality, asset class, than I am in California right now because they have a bifurcated state tax credit. So, again, you see how sound policy in a place where blended retail rate of power for industrial users is $0.06 or $0.07 is still able to finance projects just based on the tax credit.

COMMISSIONER PETERMAN: Just mention, North Carolina. Do you have a sense that the tax credit with a share of a total installed cost that would represent for PV system?

MR. JONES: I mean, it depends on the cost of the PV system. The tax credit is 35 percent so —

COMMISSIONER PETERMAN: Okay.

MR. JONES: So you can take —

COMMISSIONER PETERMAN: That'll do it.

MR. JONES: Yeah.

[LAUGHTER]

MR. JONES: That's bifurcated so it doesn't impact — it does but it's bifurcated from the ITC so it's taken separately.

MR. MARCIANO: This is John Marciano. I have some comments.

If we're talking about state credits, very few people that invest in these projects can use them unless they're transferrable or refundable. So I think if we

want to rely on state tax credits we need to be able to show that we can do one of those things. Because if we're talking about the pool's investors as JPMorgan or these large institutional investors they will not price in those credits, which means that they really go to waste.

I think the things that really do provide substantial benefit for talking about credits are sales tax credits or exclusions, exemptions, property tax exemptions, the solar property tax exemption that California has is great. The thing that would be better if we – that I think California can do with respect to the California property tax exclusion for solar is that it could provide additional clarity and certainty so that we can have consistent application across the state. The Board of Equalization has been outstanding in working with the industry in terms of trying to craft that when the legislature and large measure fell down on the job.

We've been very impressed with the Board of Equalization's willingness to move forward and try and help the industry when the legislature created ambiguity.

COMMISSIONER PETERMAN: Anyone else on the line with comments? General recommendations for California going forward?

MR. RILLERA: Please, Roma.

MS. CRISTIA-PLANT: I just wanted to add that

California Infrastructure Bank has been looking into a way, we haven't figured it out yet, but looking into a way to fund or finance the start up cost for community choice aggregators with the hopes of eventually down the road when they are passed their start up phase and they get into the phase of wanting to construct renewable projects that we can then turnaround and help finance those renewable projects. But we're only in the discussion phase. So that's one effort that we're making.

The other effort is, as I said earlier, if you could find a pot of funds potentially the I-Bank may have the ability to leverage those funds with federal resources and private resources. That would take work to do that but that is something the I-Bank Act allows us to do.

MR. JONES: I don't mean to jump back in. But one more thing, actually, kind of comes to mind. And we went down and did a Workshop at the CPUC to talk about project viability and the ability for people who have won contracts in the last two years to finance them and bring them to fruition.

When you see a solar project clear for levelized cost of power over 20 years with a major utility at $0.06 it is our thought that that developer's out there trying to raise a B-round of capital. Having large contracts on their book that equal pipeline is a good means to do it.

If any other field of the State of California, the state, the UC system, were to put forward a major contract they would require big bonds or some financial security to realize that project from the developers. If it was a means to meet its overall goals. If they were unable to do that the capital at risk to perform would be taken by the state and the fact that anybody can walk in the door and put forward a project proposal without the means, the ability or, sometimes, the intent to actually construct; and those projects and that capacity is then sitting idle while good projects are on the sideline.

I don't know what the process is. We've talked about maybe a big bond or the CPUC but something that provides some security so that people need to actually or an off ramp so people can be off ramped out of their contracts for non-performance.

CHAIRMAN WEISENMILLER: Okay. Are you aware of the liquidated damages provisions in the PPAs?

MR. JONES: There are liquidated damages provisions in the PPAs but you don't actually have to build it.

CHAIRMAN WEISENMILLER: But they're there, right?

MR. JONES: What's that?

CHAIRMAN WEISENMILLER: But they're there and

have to be considered by the developers as an obligation.

UNIDENTIFIED SPEAKER: There is some security, but not much.

MR. JONES: Yeah. You have to pay your PPA security if you actually get through to your – if you submit for your SGIP and you get interconnection you provide peak faced security based on your timeline though often times those are far out in the future.

UNIDENTIFIED SPEAKER: There is still – they are actually proportional. A little earlier.

CHAIRMAN WEISENMILLER: Please come up to the microphone and identify yourself. That's fine.

MR. ARMISTEAD: I just came from the Wind Conference.

MR. RILLERA: Please introduce yourself.

MR. ARMISTEAD: Hunter Armistead with Pattern Energy. I'm on the next panel, so.

But the – I agree with the comment. Because I think it – there's a – if you ask most utilities today they would say that they have commitments that suggest they're going to hit the portfolio standard right now.

MR. JONES: Exceed.

MR. ARMISTEAD: Exceed the portfolio standards. I guess SDG&E was probably the furthest away but with their commitments they will actually get there too.

So a common discussion that was actually discussed at the Wind Conference is California really drives the West in — with California “met its targets.” What does that mean for the rest of the Western renewables right now?

And I think your comment is very spot on. I asked a kind of a question that there’s three numbers that I’d be interested in is how much solar is operational right now and how much is under committed contracts to be built in the next four years and the third number that I’m interested in is how many are actually going to be built?

And, you know, if you knew the answer to those three numbers you would know how real it is that California has achieved its objectives. And, maybe, I’m not one of the solar developers that have those contracts so I can’t speak to them. I have, however, looked extensively at the economics of solar PV based on existing rates. And so I’m very familiar with what types of returns would be implied by the rates that are otherwise suggested in these PPA awards. Either of the numbers are going to have to fall through the floor or maybe the U.S. government is actually issuing those 2 percent treasuries to pay for it.

MR. JONES: Yeah. I mean in cluster 4 there were 90 gigawatts of interconnections studies that were

put forward when it came time for the SGIA payments that actually to pay for their interconnection. They, for their studies, the number went down to 25 gigawatts in the last round. Right. And I think those payments were due on March 31.

CHAIRMAN WEISENMILLER: I think the things that you have to consider is 1) the failure rate has historically been above 40 percent in the PPAs. Maybe higher, maybe low going forward but also the ratio between bids and accepted contracts is somewhere between 10 or 20:1.

Now obviously people do multiple bids, multiple utilities, etc. but that implies that the interconnection requests are going to be 20 times as much as necessary.

COMMISSIONER PETERMAN: And we had touched upon this issue in our Workshop on interconnection and thinking about the ISO queue because this issue of project viability just causes delays for lots of reasons and you can have something that falls through on the financial side or interconnection side. We've got a representative here from PG&E so let's here from our utility about, once again, talk about project viability.

MS. WINN: Um, yeah. Project viability. Now, actually, one of the things that we learned early on was that it was really important for developers to have some

skin in the game as far as development. And we were very vocal in advocating for bid deposits and for developers to have to put some money upfront to show that they were serious about developing some projects.

So, you know, for the utility solicitations I — you know, there's always the question of what's the right balance. Some developers, while we say it should be lower, others might say it should be higher. But, you know, there is at least some protection mechanism. And then, of course, once they do reach commercial operation if they fail to deliver then there are liquidated damages and contractual conditions as well.

MR. ARMISTEAD: But to your point I believe in the last round the security was both earlier and then upon award there was — it was meaningful but it clearly still resulted in a significant amount of awards for contracts that, you know, if they get built would be very attractive for the utilities and the ratepayers.

MR. JONES: You're talking about bed deposits which is right. I mean, if I wanted to go in and bid a project for the University of California, a solar project, to put that bid in in the first place I would have to secure 10 percent of the total contract value. And then you, as a public entity could carry that forward and if I wasn't able to meet my obligations or tried to walk away

from that number or unable to perform you would be able to recoup that money.

MS. WINN: Correct.

MR. JONES: And I think that it would – you would see – A) you would have to process a lot fewer applications because there would be fewer people that could participate and then I think people would be more realistic about what their obligations are.

MS. WINN: And that will remain to be seen as the results of the current solicitations lead to actual construction of projects. But I will say that for our solar portfolio certainly our past experience that we were estimating that 40 percent of the contracts would fail. But now that some of those early projects are out of our portfolio I think that there are many more requirements that people be in the interconnection process and be at a certain level of development for them to be able to get a contract. So not sure that we have the same failure rate in front of us. And many of our solar projects, the large ones are under construction now.

COMMISSIONER PETERMAN: So Valerie, just following up on this, and after this, Larry, let's see if we have public comment before we hear from the panelists again.

Assuming that 40 percent failure rate and

declining has that accounted for in the insertions that people have been saying that the utilities are fully sourced, the IOUs, for the 20 percent — I mean, sorry, for the 33 percent?

MS. WINN: Yes. We have factored that in into our assessment that we are very well positioned to meet our compliance obligations for RPS through at least the second compliance period. We may have some limited additional procurement we need to do to achieve the 2020 goal.

MR. RILLERA: Okay. Great. Thank you. I think what we'll do is do a brief last minute injection by the panelists and then we'll open up for Public Comment.

COMMISSIONER PETERMAN: Larry, I'm actually going to recommend that you start with Public Comment because there may not be that much and then we'll know how much time the panelists have. Thanks.

MR. RILLERA: So we'll go ahead and open up Public Comment.

MR. JONES: Do you want me to step back or stay on this panel?

COMMISSIONER PETERMAN: You can sit there but you just can't offer any Public Comment. You can talk in the next panel.

MR. RILLERA: Any comments in the room? Please.

MR. DAY: Michael Day. Rockwood Consulting again. First off, I really agree with what you were talking about the market segmentation between residential, nonresidential, owner-occupied, non-owner-occupied. That's a huge deal in working with this, I agree with that.

One thing about the PACE option, most people probably know that the residential been frozen for over a year. Commercial is also largely frozen. At the mPOWER program in Placer County has done five loans over the last two years, I think. And L.A. County has done zero. So it's — you have the Office of the Comptroller of the Currency coming in and giving guidance to national banks about what to do there that has largely frozen a lot of the PACE stuff as well.

But one class of loan products or one strategy is something that CAEATFA touched on and that's getting a lot more traction here in California. And that's private capital coming in with credit enhancement from public sources. So you have the CAEATFA Clean Energy Fund, I'm probably calling it the wrong thing, Dan. But the — you have that with private lenders. You have $200 million coming from the IOUs and really from ratepayers through the PUC process that will be partly from bill financing but largely going to go to credit enhanced programs. And

then you have projects such as the MIST 2 Proposal, that's pending here right now as an extension of MIST 1, that's also a credit enhancement.

And one of the things that that touches on that was talked about here was savings guarantees. MIST 1 was pretty instructive. That it didn't go for a savings guarantee. It said, here's a best effort and here's our uncertainty level, and presented that, in this case, residential homeowners. Now that had an audit-in modeling, review of the models, HERs out and showed what the cash flow would look like on that. Compared to a lot of other programs around the United States that was a pretty rigorous process to accomplish, especially at the residential level.

But what it did was it really gave a high level of certainty for the residences that they'd be willing to go forward. Now moving private capital in there really is a lot of value in public entity participation. Partly for reviewing the models that have been done and also bringing trust by the part of the financial institutions. And, in some cases, it can be very cost-effective. I think overall policy goals, if you're looking at different financing mechanism wide segment breath, trying to get as broad as a program as possible with limited dollars. So, for example, we heard about a solar PPA that was in the

700s, mid-700s FICO score, you see the MIST 2 down to a 640 FICO score. So program breadth can be a very important characteristic.

I think that low monthly payments is really something. You see a lot of people focus on what are the points or what are the interest rates or what is the term. We're really talking about leveraging the savings in a cash flow model so part of the reason the MIST 1 did so well is it had a monthly payment factor of 0.67 percent. MIST 2 is under 1 percent. I think that that's really something to look at going forward with those programs.

And, finally, to the extent that any of these programs are going to be using public dollars, I think that you have a pull along ability to require best practices, even if they are a little bit more cumbersome. As well as to really gather a lot of this data in a very comprehensive and standardized manner so that maybe the ratings agencies can start taking a look at the loan performance of this. And maybe they can't make a decision. Maybe there's not enough data there. We haven't been through enough business cycles to decide it on its own but what we can start doing is providing a correlation between other known data sets for similar types of credits and that that might get us to a place where ratings are possible on a more accelerated basis. Thank you.

COMMISSIONER PETERMAN: Thank you for your comments. And you obviously have been thinking a lot about this space and have some informed comments and questions. So to the extent that you're interested please expand on them further or summarize them in written comments.

MR. RILLERA: Any more comments in the room? Do we have anything online?

MS. KOROSEC: All right. The phone lines are unmuted if you have any comments. All right. Nope. No comments.

COMMISSIONER PETERMAN: Let's go back to the panel for any final comments and those on the phone as well.

MR. RILLERA: Panelists, if you have any final comments or remarks you want to add or online?

MR. MILLER: This is Seth Miller again from DBL Investors.

A lot of the conversation today has focused on generation efficiency or demand side management and I just wanted to say that the state should also consider, and I know you have in the past, advanced storage when you're thinking about encouraging these technologies and helping them grow through the different types of incentives but please do remember that advanced storage has a lot of

potential to help the clean energy generation and the demand side management and get clean power in the hands of people at a time when they need to use it. Thanks.

COMMISSIONER PETERMAN: Thanks for that point.

MR. JONES: The only thing that I would say is that it's encouraging that I think that the culmination of this you hear from a lot of different people as they're starting to think of energy and all of its impacts. And what that's coming to is integration. And, I think, we're starting to fall out of thinking about renewables as siloed technology. And as we look at policy and we write policy and propose it it really does look at all renewables of energy.

COMMISSIONER PETERMAN: I'll just add a point on that. We're having a Workshop on Integration on June 11 but we talked about this in, I think in maybe the Cost Workshop about how historically integration costs have not been something that's been a consideration in the PUC procurement process and there's a rulemaking where they're starting to look at that now and, increasingly, when looking at all in technology costs, all system costs, this is going to be an important factor to consider.

MR. RILLERA: Okay. Great. Thank you, Jesse. John? Paul?

MR. MARCIANO: Sure. John Marciano here. I

think that the bottom-line as far as investment in these types of renewables is consistency. So if no matter what policy the state decides to go down I think we should think about ways to do it in a consistent measure that lasts for more than just a year or two. Thank you.

MR. RILLERA: Thank you.

COMMISSIONER PETERMAN: So I'll make a comment on that point. I think consistency is important. I think consistency is more likely if we have public, private match. I think the reality is just that there's not enough money in the public sector to make these investments at the scale needed over many, many years and so to the extent that we can leverage private capital, which is what we are trying to do, and some of our investment programs here at the Commission, I know the I-Bank and CAEATFA's thinking about will be important. And so we appreciate your suggestions on how to better do that.

MR. RILLERA: Thank you, John.

MR. MARCIANO: Thank you.

COMMISSIONER PETERMAN: Yeah. I'll just – thank you to all the panelists. I mean this has been helpful to have all of these comments discussed at the same time. It's slightly pessimistic, I'll have to say, in that – I'll be honest. Because, I think, we're moving into a

period where we have less of some of the federal incentives available. We also had an opportunity particularly in this state to take advantage of some ARRA funding, which is now declining or ending and we're going to be talking about that in the next panel. There is a need to talk about what mechanisms we can do within the state. What else we can encourage at the federal level.

And, generally, also I don't feel like we got a really good answer about fundamentally how the deal with some of the initial early financing for commercialization as well as the DG, some ideas are being kicked around, maybe we can submit some of those more in the strategic plan. But I think there's a need now to move forward with something new and this discussion has highlighted that for me. Chair?

CHAIRMAN WEISENMILLER: Yeah. I was going to say that I think, again, certainly on the written comments the thing that would be interesting is that in the first session we talked a lot about sort of the innovative technologies. Now in California we have a lot of innovative technologies – many of the things we do may be considered innovative elsewhere but that we're trying to move past the wind and solar energy efficiency to as you say the more venture capital types of stuff or mezzanine capital, but anyways, any thoughts on how to encourage

that innovation would be good.

Another thing that I was just going to note is that if you look back in the middle, well, late 80s there was a book banner ACEEE on performance contracting, which I was actually one of the authors on that, and I would say that many of the things people talked about today sounds like things we said then. But, at the same time in terms of that industry, it's not really taken off is the bottom line. So certainly it's worth thinking about any of the things we could do to really move the performance contracting needle along. Certainly, again, as a way to — you know, just the reality is, I remember the first time that we were doing this report, people had lots of ideas on if the state had lots of money on what we could do to really help in financing innovation. And the reality is the state doesn't have lots of money, you know, and we have a very bleak budget situation so we have to be a lot more creative. And certainly what we're hoping for is some creativity in your comments.

COMMISSIONER PETERMAN: And also, just to add, in terms of opportunities with the RPS we've touched a bit upon how three investor owned utilities have contracts or projects in place to meet, at least, the first and second goal targets of the RPS. And just to remind everyone that that's not necessarily the case with the public utilities,

which are now obligated under the RPS. And particularly, we've been talking to some of the small public utilities and they have a smaller procurement target to meet. They also have less money opportunities or funding available. So they're looking for these opportunities with some of the smaller scale on the DG. Some of the ones that are really not captured in some of the financing programs that we've talked about and they're trying to figure out a cost-effective way to meet the RPS and so opportunities do exist.

CHAIRMAN WEISENMILLER: Yeah. And I think at each of these Workshops we've always reminded too that the people the Governor has said 33 percent is a floor not a ceiling and certainly one of the things that we'll be interested in this IEPR is looking at growing beyond 33 percent to a higher level and what are the costs and benefits of that, realizing there are both.

COMMISSIONER PETERMAN: Agreed. And figuring out a way how to provide that financing is going to be key to getting to a 40 percent target or even something greater.

MR. RILLERA: Okay. Great. Thank you, everybody. Want to thank the panelists for participating today.

COMMISSIONER PETERMAN: Thank you, Larry, for

your moderation. We'll be taking a break. We'll reconvene at 2:30. Thanks.

(Off the record at 2:17 p.m.)

(Back on the record at 2:42 p.m.)

MS. KOROSEC: Welcome back. We're now going to begin our third panel on American Recovery and Reinvestment Act Projects, Status and Next Steps. And our moderator is Felicia Miller from Energy Commission Staff. Felicia?

MS. MILLER: Thank you. Good afternoon. My name is Felicia Miller. I work in the Siting Division as a Project Manager. Thank you for inviting me to work on this panel.

Our presentation today has to do with ARRA projects and ARRA financing. Due to the dynamics, complexity and impacts, ARRA and ARRA-funded projects have on the development of renewable energy in California; the California Energy Commission could have had a standalone Workshop just to discuss ARRA workshops. However, working within the time constraints of the Workshop my portion will provide a very brief overview of the ARRA programs, a report on the status of Commission-associated solar thermal projects as well as a panel discussion represented by developers who successfully received ARRA funding as well as representatives of projects who were not

successful.

The American Recovery and Reinvestment Act of 2009, also known as the Stimulus Act, was established to jumpstart the U.S. economy, create or save millions of jobs and to invest in the nation's energy future. ARRA provided almost $94 billion in direct and indirect spending through tax incentives, grants and loan guarantees to clean energy companies and projects. Renewable energy projects benefited under ARRA primarily from several programs geared to facilitate renewable energy projects. Specifically, section 1703 and 1705 and the 1603 grant program.

$6 billion was provided to the Department of Energy's Loan Guarantees Program under program 1703, a program under the Energy Act of 2005. Although most of those funds were raided by other programs, $2.5 billion remained in the program which funded innovative energy efficiency, renewable energy and advanced transmission and distribution projects.

The ARRA Program amended the loan guarantee programs authorizing legislation by adding section 1705. Section 1705 is a temporary program which authorizes loan guarantees for certain renewable energy systems, electric power transmission systems and leading edge biofuels projects that commence construction no later than

September 30 of 2011.

ARRA also created the 1603 grant program, which offered renewable energy project developers cash payments in lieu of the investment tax credits. Per the DOE website, over $11 billion has been dispersed for projects associated with biomass, geothermal, solar and wind.

As a result of the availability of ARRA funding, beginning in 2010, the Energy Commission was inundated with applications to certify solar thermal power plants. The CEC completed the licensing of eight solar thermal projects with a ninth project pending, representing more than 4,000 megawatts of solar thermal energy. Of those nine projects, three are currently under construction with a fourth energy project slated for construction start in 2013 and a fifth project undergoing a major amendment. And those projects are as follows, projects currently under construction are:

Ivanpah, developed by BrightSource. The project is about 20 percent complete and started construction in October of 2010. The project received ARRA funding and the first tower block is scheduled to go online in quarter one of 2013.

The second project under construction is Abengoa Mojave Solar. The developer is Abengoa Solar, Inc. The project was approved in September of 2010. It's developed

on 1,750 acres of private land. It did secure ARRA funding. It started construction of October 2011 and is 90 percent graded. And is scheduled for commercial operation of quarter three of 2013.

The third solar thermal project under construction is Genesis Solar, which is being developed by NextEra. The project was approved in September of 2010. It's on 1,800 acres of land leased by the BLM and it did secure ARRA funding. The project started construction in August of 2011. It's about 20 percent complete and is scheduled commercial operation of the first unit is for May 2013.

In addition there are two projects in the Commission right now undergoing post-certification process. They are Rice Solar Energy, being developed by Solar Reserve. The project was approved in December of 2010. It's 150 megawatts of salt storage technology with a center receiver tower and it's on approximately 1,400 acres of private land. The project is in pre-development stage and staff is processing compliance submittals. The project is currently scheduled for a March 2013 construction start and the developers are currently working to secure construction financing.

The fifth ARRA project that's in-house is a Calico Project being developed by K Road. It was approved

in October of 2010. It's on over 8,000 acres of private land. The project did not secure ARRA funding. K Road purchased the project from Tessera Solar. And CEC jurisdiction was established in May of 2012 under AB-1073 that allows the CEC to process amendments to previously licensed thermal projects. The developer is meeting with the Energy Commission to discuss an amendment to convert the project to 100 percent solar.

The unsuccessful ARRA projects, there is five of them. Three of them are — were represented by the developer Solar Trust of America. They are Blythe, Palen and Ridgecrest. As Solar Trust of America was a subsidiary of Solar Millennium and they are in the middle of bankruptcy as of April 2012. And the three projects are on hold pending sale. The exception is the Ridgecrest Project which is undergoing jurisdictional reconsideration.

The last ARRA project is the Imperial Valley Solar, which was being developed by AES. It was approved in September of 2010 and an order terminating the decision to license it was approved by the Commission in August of 2011. It had to do with Sterling Engine Systems going bankrupt and the project being reconsidered to undergo conversion to 100 percent PV.

While financing renewable projects continues to

challenge developers, no one can dispute that ARRA funding was an essential component leading to the successful launch of numerous renewable energy projects.

Please welcome the panel of guests representing a cross section of companies with successful as well as unsuccessful ARRA funded projects and who graciously accepted invitation from the Energy Commission to share the their experiences getting their renewable projects from groundbreaking to completion.

So let me introduce Scott Busa who's the Director of Business Development for NextEra and they have the Genesis Project in their portfolio. Scott Galati a partner with Galati Black who was representing Solar Trust of America in their bankruptcy proceedings and is also currently representing Calico for K Road but is here not representing anybody. He's here to talk generally about solar projects and financing. Right? Randy Hoyle, Senior Vice President from TerraGen Wind, which is represented by the Alta Wind Project that received ARRA funding. Hunter Armistead, an Executive Director with Pattern Energy who has a successful Patched Ridge Wind Project that also received ARRA funding. Chris Ellison is a partner with Ellison, Schneider and Harris. Chris is here representing the Abengoa Solar Project. And on the phone, representing BrightSource Energy in place of Joe Desmond who got sick,

is Keely Waugh who is the Senior Director of Corporate Communications. And they're representing the Ivanpah Project.

I have three questions on my panel if you'd – do you have anything to add, Commissioner Peterman?

COMMISSIONER PETERMAN: Thank you, Felicia. First of all, thank you for that comprehensive introduction. As one of the sitting Commissioners who's not here during the – when the ARRA cases were brought to the Commission, I have a little bit less familiarity with some of your project and so as you talk about them it would be good also for everyone just to distinguish between them just as you reference them, just to make a note again of whether that's a project that's currently started construction. If not, when. And looking forward to your responses to these three questions as well as we've been spending the day talking about financing and what's needed in this space. And so, after those first initial questions are addressed, I'd welcome any of your thoughts about activities the Commission can engage in going forward to facilitate the development of projects, particularly the financing or other things that we can recommend as part of this strategic plan.

Just as reminder the follow up from this Workshop as well as the other six Workshops as part of the

strategic plan will be to develop some actionable steps. Things that are going to be necessary, maybe not overly sufficient, but necessary to meet the 2020 goals in particular. And we have an expert panel here and I'm looking forward to the discussion.

MS. MILLER: Great. Let's start off with our first question and for my panelists the questions are posted up on the wall.

So if you'd like to lead off the discussion, Scott?

MR. BUSA: Sure. There's two of us. So Scott B.

MS. MILLER: Scott B.

MR. BUSA: Again, I'm Scott Busa with NextEra Energy and we have — currently have the Genesis Solar Thermal Project, which is under construction. And I do want to mention too that we also at the same time that one was approved we had the Beacon Solar Project that was also undergoing Commission review. And that project is not under construction. It's on hold right now.

I think the point I want to make on planning efforts are necessary is really a timing issue. That planning for Genesis, for example, goes back to 2007. So these are long-term projects that took, you know, several years of planning before they were brought to the

Commission. We quickly made it through permitting which we're thankful for and then the startup of construction and the actual construction period is extremely lengthy in these large solar projects.

But just to say that even pre-ARRA the planning had to take place for the Genesis Project, in particular that planning involved, you know, where we would place the project, the land for that and it also involved an early interconnection request. Even before the cluster studies were done, Genesis was one of the applicants in the old serial interconnection. And so that was, again, placed in late 2007, early 2008. It was transferred over to the transition cluster so really you're just talking about a project today under construction that was part of the, you know, early transmission cluster studies. And that was key to bringing the project to where it is today. And today looking at the where we're at, you know, with the fifth transition cluster and now moving on to the sixth or I'm sorry, the sixth cluster study. Those are for projects that are probably post-2020, in my opinion.

Right now we're dealing with projects that were planned a long time ago. So early planning is, I think, key to the success of Genesis.

COMMISSIONER PETERMAN: And Scott, can you just share, what was the total amount of our cash grant and

what was that in terms of, you know, relative to the overall project cost?

MR. BUSA: The project qualified for one of the loan guarantees under the existing technology. It was not an innovative technology. It's a solar thermal project. And that was approximately about $850 million of guarantee from the DOE. And they guarantee about 80 percent of that number is actually how that program works.

The project will also qualify for the Convertible Income Tax Credit, which is about 35 percent of the project cost and publicly the Genesis Project is — installed costs is just over $1 billion, about $1.1 billion.

MR. GALATI: Scott Galati. I'll go ahead and speak. I have a different perspective, a bit of a different perspective. In working with several clients and bringing projects from early planning stages through interconnection through permitting to PPA negotiation and being part of that team but not certainly the initiator of any of those objects. So I probably can't answer a lot of specific questions about individual projects but I will give you a little perspective about planning efforts.

And you'll see a common theme in underlining all three of my answers to these questions. And the underlying theme is is how do you deal with uncertainty?

The more uncertainty there is the ore difficult that it is to plan. I know with these projects, for example, the Solar Trust projects, the Blythe Project, the Palen Project and the Ridgecrest Projects all started in 2007.

If you think of what happened between 2007 and the time that they were licensed there's a wholesale change in the way that we do transmission studies. There was a change in how we did permitting. There was the ability for ARRA funding. There was a change in procurement policies. And so part of me welcomes when an agency, such as the Energy Commission or the PUC, undergoes these kinds of studies to come up with better ways to do things. And part of me also says I wish there'd be no more studies so at least there would certainty, even if it's bad certainty.

And I think that's part of the – that would be the one thing that we would do in retrospect is many of the developers of these, of the projects that I worked on, were technology creators, they were innovators. They were people who came up with a technology. They weren't necessarily energy developers. And I think that many industries start that way. Where the innovator takes what they've created and then tries to put it into action. And the problem with that is is especially in California a very experienced developer is necessary to take what an

innovator wants to do and plug it into how California works.

I think that the industry has very much matured in that way. I think that the innovators have become knowledgeable and I think that developers have stepped up to take innovative technologies.

So I think that's probably nothing anybody could really do. I think it's a natural thing. But what I think what ended up happening is that those innovators were not part of the planning. They were not participating, I think, meaningfully in a lot of the early efforts as to where to put projects, where transmissions should be because they were very much used to some other places and some other states or other countries in which those issues were resolved already or they weren't influx. Nobody knew they had to solve them. So there was some certaintiy in that.

So, again, what I advise clients whether they are innovators or they are developers is that they have to participate in forums and in helping to shape policy, even if they have no effect on the policy. Just so they know what changes are coming up because it's that uncertainty that I think has been the number one obstacle to some of the projects being successful.

The Solar Trust of America Blythe Project

qualified for the loan guarantee. At the last minute it decided not to take the loan guarantee and to not enter into that agreement because at that time the cost of the project and the PPA and where it was in its development just didn't make sense at that stage.

So I think what you're seeing, at least what I'm seeing with some of those projects that were not successful from a solar thermal is they are taking advantage of becoming more technology neutral and switching to PV. And when I say technology neutral I mean which panel or which panel manufacturer and they are proposing to change these projects. I know the Blythe Project will be taking advantage of the SB-226 and will be filing an amendment in the same way that Calico is for 100 percent PV project.

That's kind of my perspective and, again, there is one other thing. I don't think people realized after the time you got your permits, whether it be federal, state or local, how long it make take before you actually get the authorization to move dirt. And so there is a lag time that I think you'll see in my recommendations down below that might be able to add some additional certainty in that area.

COMMISSIONER PETERMAN: Thank you, Mr. Galati. I'll note that you pointed out, you know, another type of

uncertainty, which you maybe weren't explicitly calling out which is just uncertainty around technology costs and competing technology costs. And that's an uncertainty that the state also faced with solar thermal projects and having the companies then become technology neutral and one of the questions that I brought up in our cost Workshop was what's the difference in both the overall cost then for the projects. When we think about integration costs I expect that they'll be different between solar PV and solar thermal, and then how do these resources now fit into the – our energy needs overall in terms of the mix of resources and the attributes we need to provide.

But thank you for your comments. Those are helpful. And I think, also, that they speak to some of the issues we'll have to think about with technologies that are less commercialized. We've had these experience now with solar thermal and you have the innovators who have turned into energy developers. But as a cautionary note for other technologies that want to scale up that the value of doing the same or partnering with an experienced energy developer.

MR. HOYLE: Yeah. Good afternoon. My name is Randy Hoyle.

COMMISSIONER PETERMAN: Good afternoon.

MR. HOYLE: I'm Senior Vice President and Head of Wind and Solar Development for TerraGen Power.

I guess the inexperienced people on the wind side are two guys in an Avis car, you know, but the inexperienced solar are two guys in a Mercedes. So. Just a little humor there.

We actually at the end of the year will have constructed and brought and serviced 1320 megawatts of wind energy. They comprises up nine projects at the Alta Wind Energy Center in the Mojave region in Kern County, 1,020 megawatts of those are already in operation. Just earlier this year we raised another $650 million for a total of $2.85 billion that we've raised to date. And it's really one of the best kept secrets. I think not a lot of people are aware of those numbers. You know I think in Kern County wind investment by the end of 2012 for the last three years will be approximately $5 billion. That will result in approximately $60 million annually increase in property taxes to Kern County.

Just TerraGen's projects alone represent 2,047 construction jobs. That's direct, indirect induced. And then during the operating trade approximately 600 jobs. Not to mention that we've, at the end of 2012, we contributed $178 million in state sales tax to California.

I guess on the first comments on what's been

successful, you know, we have benefited obviously from the RPS. Another thing is transmission planning. Transmission Project, a $1.8 billion investment by Southern California Edison received upfront funding approval not only from FERC but also backstop authority from the CPUC. Having that be upfront funded by the utility is key. If those costs were put on the generators I don't think you'd see as much progress as we've made today. I think the California Executive Office is also, you know, from two administrations in the last four year have been extremely supportive.

Kern County, one of the things that we did — one of the reasons that we sited the projects there is because Kern County had experience with CEQUA. None of the — even though I think 7 of our 490 turbines are on federal land we went through in a matter of three years, actually about four years, three separate CEQUA documents for basically $2.85 billion of investment.

We focused on private land. I think that if we'd have focused on public land we would not have been as successful. You know, we didn't benefit from the 1603 program. Just round numbers, about $900 million of the $2.8 billion and we stayed away from the Federal Loan Guarantee Program. We think that that way key to execution as well.

We would have gone through an extra step to achieve NEPA coverage and the delay and the benefit just wasn't there from the Federal Loan Guarantee Program.

I think the last thing is I also lead solar investment and Hunter talked about it a little bit. But the one thing that I can say about wind even though it is intermittent is its tried and true technology. Banks are comfortable with it. Equity is comfortable with it. The transaction structure — actually the financing transaction structures we did — we did three different types of transaction structures here. We had a single investor lease on one project. One four we had a sale-lease back transactions. And in each of them we had construction financing and we even monetized some of the assets and sold them to strategic investors.

We ran the gamut but all of those avenues were available for the project and multiple avenues were available for us to finance. And part of that is tried and true technology. I know what, you know, we have a 400 megawatt PPA backlog and all it's waiting on is some federal action but we believe that we can deliver about another $800 million of investment next year. And I know what price we can deliver that for.

COMMISSIONER PETERMAN: So just a follow up question, Randy. You said that you also have experience

in developing solar. So regarding your comment about the banks being comfortable with wind and being able to do the three different types of transactions. So with regards to solar, where is their comfortability level relative to wind? And what do you think it'll take to get it close to that?

MR. HOYLE: Well, right now in our portfolio we have — by the end of the year we'll have 1320 megawatts constructed. By the end of 2012 we will have 0 megawatts of new solar in the ground. And it's, I think Hunter alluded to it earlier, the — right now the issue is pricing. I mean who's going to do a deal at $0.07? We just don't think that that is reasonable. We can't, you know — first of all, before you get the banks involved equity has to have a return somewhere. And we just, you know, we just have not been able to make it work from an equity perspective. And some of that's timing because if you see the 2010 and the 2011 vintage PPAs we think that those are some of the PPAs that won't get built. And some of the PV that's going to get built benefited from 2009 RFO prices and they benefited from a substantial reduction in panel pricing. That's primarily why those things are going to get built. So.

We just had trouble from an equity perspective in making it work. I know some other people have had

success, you know, when it came to allocating capital we elected to put it in a, what we considered, to be a low risk area.

COMMISSIONER PETERMAN: And so in your comments, specific to solar thermal and not to solar PV, then.

MR. HOYLE: I think they apply to solar PV as well.

COMMISSIONER PETERMAN: Okay. I'm just thinking, then, regarding the comment about — so are you referring to solar PV that was pre-2009? Is that your — Because I'm thinking that everyone should be able to take advantage of the lower module cost, for example. And just wondering what's not competitive at the $0.07 offer price?

MR. HOYLE: It is my opinion that thermal and PV technologies are challenged at $0.07. That's what we believe.

COMMISSIONER PETERMAN: Well, that's why we have you here. To give your opinion. So appreciate that.

MR. HOYLE: But, you know, the pricing back in 2009 is not available now. So not everyone could participate. Some people ended up signing PPAs and things actually went their way and now they can build them and that's fine. And that's how it works out. So.

MR. ARMISTEAD: I'll go ahead. I'll go through the questions but I can comment a little bit too on the

technology because we've looked at solar thermal. We're actively working on PV projects and we have wind projects.

Just to build on – we do have one project that went commercial in 2000 – roughly 2010 and that was the Hatchet Ridge Project that did take advantage of the 1603 and the grant. And that was a – and that project is fully operational. It was a very successful and, frankly, probably would not have happened if you had looked at the time when this was financed without the stimulus money. The ability to finance the PTC's, or the Production Tax Credits, that were available to wind basically disappeared in that timeframe. And so absent the stimulus occurring it's very likely – cause one of the things that I would comment on that is – it makes – it requires a very savvy developer is if you think about development it's a bit of a race on like four fronts. You usually have some timing endgame that's going to kill the project. Like the PPA is going to expire. You're not going to be able to utilize the interconnection in the right time. You'll have a permit that's going to have to be completed at the right time. It's an extreme balancing act of managing, like, four different things to occur and all to happen within the window when it's allowable for you to build your project.

California is – we develop projects, as does

Randy and TerraGen, all over the country. In fact, in Chile and Canada. And California has to be considered one of the most difficult and challenging places to operate. And I do think that ultimately I agreed with a little bit of the comment on some of the – one of the real issues with solar PV development has been is that the barriers to entry are relatively low and has resulted in, you know, I think that's why there's so many applicants that you have out there. And we'll see how it all shakes out. I think that's a comment observation.

Technologically though, it is a lower risk. I would say as it relates specifically to PV, you can certainly attract debt to that very – it less – with lower risk than even wind because the production risk is less. The biggest issue that you end up having right now is it's an interesting way of talking about technology risk because what people started responding to is that they weren't responding and getting PPAs based on where they thought the cost of building was today or even the cost they thought they could get a contractor to bid in the future. Because no contractor would say that I want to bid it for $1 today and $0.50 tomorrow. What they did was they said, I really – we're going to play the game and see if it works. We're going to bid at this level and hope that the cost came down.

And then a lot of people were successful and a lot of those projects are getting done.

So going back to my questions because I got a little bit off topic here. We do have a second project right now that is actually just entering construction down in Southern California. It is on federal lands and if you really want to add a fourth dimension to the chess you get to play in California, add the BLM and the Native American area developed in Southern California. And you would say, "Why in the world would you ever want to do this business?" Because it is incredibly difficult to manager this whole process to get this to conclusion.

And it is why you do see, in California, revenue — there's two big reasons why I would say you see PPA pricing higher in California than you do in other places. One is the difficulty of basically managing that balance that I just mentioned and the uncertainty that you might actually have success on one and fail on another one. And then believe it or not is the sales tax. There's just not that many places where you build wind where you have to pay the full rate on the sales tax. That's just a — that just adds a few dollars to whatever you do out there.

So right now we're building another project that is just entering construction and has to be done by the end of this year. It is extremely exciting, as I guess I

would say, to try to build a 500 kV switch yard and get up a 265 megawatts of turbine in the next 7 months. We have every expectation of doing it.

So you're looking at what the stimulus has done. It did stimulate. This project wouldn't have been done, you know, without having access to that and we have a window right now to other close it. If you, you know, the question is what would you have done differently? The flippant answer, in some cases, is maybe in some cases we just shouldn't have done it. It was just too hard, you know, to get – if I would look back and say, "As hard as we thought it would be it was harder." And have an appreciation for as long as we thought it might take, it takes longer. And that is, even that is said from a developer who's developed, you know, we've done 3,000 megawatts in the past eight years.

COMMISSIONER PETERMAN: Obviously there's a learning curve that developers and the state and the local agencies had to go through with siting these projects. You noted that the project was harder then you anticipated. Do you think the next one will be easier? Just trying to get a sense of how much of the knowledge we've gained in this process will be transferable and make the process easier going forward or if there are just some inherent time and cost that are going to be inherent with

each project that you don't get benefits from in scale? Your thoughts on that?

MR. ARMISTEAD: I think that as a developer yes. It's funny. Maybe we're just gluttons for punishment. We've had experience doing this hard work before. That means we're — we actually think we can do it again. And we think that others — but I do think that others don't know. How can you not — how can you know what you don't know. And you can't know what you don't know until you've learned what you didn't know. And that sounds all circular and screwed up but it's the reality of development. I would say the most — one process worth commenting on right now that has just been so evolutionary has been, effectively, the interconnect process and what's gone on with the CAISO and what's gone with these net deliverability upgrades. It's such a mystery, you know, and we're in it. And so to be able to — and so I do feel like things are improving and I think that with more projects that have been done like we've done a few projects on federal lands and there's a greater knowledge base of what it takes to make your way through with everything that gets more done. But I do think that there will — unless you have done it before it is very hard to expect that someone is going to make it through a process as complicated as it is to do, I know what you've done at

Alta or what we've done at other places.

Some of the solar PV a little bit easier, frankly. It is simpler but you're still going to have issues.

COMMISSIONER PETERMAN: And I'll note you in response to the question you noted that the question says, "What would you have done differently?" And so I want to give you an opportunity to tell us what we should have done differently and by we being the collective whether the Energy Commission or the various bodies that you've touched upon or the local agencies. And I'll note that there is a siting lessons learned process that's ongoing at the Commission, which those who work more with the Siting Division get to speak to. So we're aware of some of the things now that we would do differently in terms of helping to facilitate these projects but welcome your thoughts. And when the other panelists go to answer the next questions, also welcome your thoughts as well.

MR. ARMISTEAD: You know, in some cases – and maybe the Commission can't do this and maybe this isn't the right way to answer that question but in some cases you ought to tell people don't build your project there. You know, it's going to be too hard, you know. And I do think that, especially with some of the wildlife issues and the sensitivity issues, you know, somehow the area

where you can actually accomplish a siting of a facility of the size that we're talking about and a lot of these projects – sometimes it's really just not worth the journey.

COMMISSIONER PETERMAN: Thank you, Scott. Sorry, Randy. Did you want to answer that?

MR. HOYLE: Yeah. I would just – if there's one piece of feedback it's when you start getting into state agencies, federal agencies. It's very – if you're dealing with a county you know who you're dealing with. You're dealing with the Board of Supervisors and you're dealing with the County Planning Director. So you're – you can negotiate with someone. It is very hard to understand, at least on the state side of some of the agencies, and the federal side. Who do you negotiate with? You can talk to people in Washington. You can talk to people in the California state offices. You can talk to the people at the working level, the biologists and yes it's everyone wants it but how do we get through the process and who can make the decision. And sometimes that's very hard to find. If I wanted to do a deal with Hunter, I call Hunter up and we talk and we negotiate. Sometimes it's very, it's very difficult to understand that on the federal and the state side.

We have all the contacts. It's just how do you

get to a decision?

MR. GALATI: I'd like to add a little color to that too. I agree with what you're saying and that's all true until the county changes. And so there are some counties that don't behave like other counties.

MR. ARMISTEAD: That's true.

MR. GALATI: And it happens at the state level as well. Sometimes it's easy to have a conversation, then something changes and it's hard to have a conversation. So, again, that was what I was trying to get to with the concept of certainty. It takes strong leadership to stay consistent. And it's very easy to not consistent, especially with the different stakeholders and players here.

And I'll just give you a perspective and I know that this is a Siting Lessons Learned – a lessons learned siting but here at the Energy Commission 1950 megawatts I worked on, I had projects completely on private land. I had projects on public land. I had projects in the middle of nowhere. I had projects right next to a city. I had projects – no single project had any local opposition and yet I didn't get an outside group to support a single project. No matter what mitigation was done. No matter what land was chosen. No matter what technology was chosen. So it is that environment in which we live and I

think the purpose of government, be it local or state, is to provide us certainty in that environment. Because, trust me, the financing community sees that and while I'm not a financing expert, I can give you a little anecdote. And that is a project, exact same technology in California on private land, exact same technology in Nevada on public land. They were applying for a DOE loan guarantee and the DOE loan guarantee in the early stages was trying to rank the risks of the relative projects and the project in Nevada got a high ranking on the idea of government certainty. And in California the initial assessment was the same rating as the country of Angola due to the possibility of a governmental coup. And I thought that was a joke when I first heard it and then I saw it written by a DOE, the score, and we compared it. And it was. Now it got changed but that is the initial assessment by people who don't understand California. And the worst part of that is when they try to understand California it gets worse before it gets better. It takes a long time.

That is — I know that's getting into question three but that's — apologize Chris, I know it's your turn.

COMMISSIONER PETERMAN: They all — Chris, we will get to you. Don't worry. We could not forget about you.

Scott, I just wanted to make sure I draw the

correct points between the last comment you made. So your first comment was that regardless of the project you're not able to get an outside group to support it. So your meaning is community groups, citizen groups — I'm trying to make the connection between that and then the comment about the certainty need you provided on the government side.

MR. GALATI: I think that in California we tend to wed ourselves to the process instead of wedding ourselves to a result. And I tend to believe it takes strong leadership to say, "Enough process and let's get an appropriate result." And I think that a perfect example is when there is opposition to a project with no basis with some larger planning goal, not a specific project basis, it takes strong leadership to say, "We're going to cut through that and we're going to provide a result." And whether it be at the county or the state it takes that kind of leadership. Apparently, I think that kind of leadership is happening in Kern County and it sounds like there's been great success there.

That's all that I would say is that if you're crafting something that ultimately it's that kind of leadership that makes it a far bigger difference than in fixing the process.

COMMISSIONER PETERMAN: Thank you. I think one

of the things though that I'm constantly weighing in my head is transparency and efficiency. I think there's some trade-offs between the two and when I think about the process, albeit in places broken, I think one of the objectives you hear a lot of times is being transparent and a lot of opportunities for public involvement and that comes at the expense of how quickly you can get the process done. But I think your points are heard and well taken.

MR. BUSA: Commissioner, if we're moving backwards I would like to comment that –

COMMISSIONER PETERMAN: Yes, we are. This like a game of Uno. We're never going to get to you, Chris. Go ahead.

MR. BUSA: Actually, I'll roll him into my comments here, too. We're talking about certainty and one of the things that NextEra has had a problem with for a long time and it actually goes back to some early IEPR or the I-E-P-R proceedings. Both with fossil plants before the Commission many years with our Beacon Project and with our Genesis Project all three of those were proposed examples of what could work. And call us stupid but in all three times that we tried to do that we've been rebuffed either by staff or by the Commission. None of them ever actually ended up being a wet cool project and

two of them did get granted a license for recycled water and Genesis, the final one, is a dry cool one. But the water policies that come out of – or early IEPRs are not necessarily consistently applied, in our belief.

And we spent a lot of time, a lot of our own time, a lot of money and a lot of the Commission staff's time trying to figure out what the water policy actually is. And as kind of a – what we found was to be an inconsistent decision and I'll turn it over to you Chris, the Abengoa Project was actually a wet cooled solar thermal project, which was something that we weren't able to achieve no matter how much mitigation planning that we proposed for our three project examples that I've had experience with here. That's one specific example that I'd love to see some clarification on through the IEPR or other Commission policies is wet cooling.

COMMISSIONER PETERMAN: Thank you for that point. I think you've touched upon a couple of things. One, that in these IEPR proceedings we cover a lot of issues at the policy level and making sure that that policy consensus or engagement with it that we've had from various comments have been provided by the public and stakeholders then gets translated into our more specific policies. Particularly with the siting cases and that's not precedential, those cases, as we've talked about as

surely but acknowledging that having some consistency is good. I'm also guessing you didn't hire Chris Ellison for it though. But we'll turn to him and see how he managed to make things happen —

MR. BUSA: I had Mr. Galati here as my representative.

COMMISSIONER PETERMAN: I have no preference for either. Mr. Ellison, please.

MR. ELLISON: All right. That's a great introduction I have to say, thank you.

Well first of all I'm Chris Ellison. Ellison, Schneider and Harris on behalf of Abengoa Solar. Erin Bradley could not make it today and apologizes. Something came up. We very much appreciate the opportunity to be on the panel.

I'm going to try and be very brief, although there's so much that there's been said that I would love to talk to. And we will submit some written comments that I'm going to summarize.

Before I go any further though, since it's fresh in my mind, let me say one thing about the water policy issue. In that case, in the Abengoa case, it did end up with the Mojave Solar Project being allowed to do wet cooling but in order to do that they were required to surrender ground water rights in addition to the water

they were proposing to use as mitigation for the water that they quote/unquote consuming.

This occurred in an adjudicated water, ground water, basin with a state court decision that had already allocated water rights to the project. And, in my opinion, when we get to the question of what would Abengoa have done differently if it were to do something in a different context, and I'll touch on this in a minute. Abengoa, I believe, would have contested more than anything, the water decision. Of losing their adjudicated ground water rights in order to permit a project. And that's a much longer discussion but that's what happened.

Abengoa's Mojave Solar Project is fundamentally a success story, both for the Commission and for the company and, I believe, for the state and for DOE. With respect to the planning that went into creating that success, it's under construction now —

Let me back up. It's a 250 megawatt thermal solar project, located on private land. It's immediately adjacent to the 1980s LUZ SEGS solar project, so there's already solar thermal at that site. It had, essentially, no desert tortoise issues. It was previously disturbed private land. It was sort of an optimal place to put this kind of project. It was filed on October 21, 2009. It was permitted in 10.5 months and made the ARRA deadline.

One of the things that contributed to that success, I think, was the planning that went into choosing the site and choosing the technology. Another thing that contributed to the success, I think, was the ARRA deadline. There've two times in my — I've been doing this at the Commission or before the Commission before 1978 and there are two times in my experience when the Commission, apart from its statutory 12 month deadline, has had a sense of urgency and a deadline that it had to meet. In this case it was ARRA. During the energy crisis it was the energy crisis.

And I think it would be a quite interesting exercise, actually, to go back and look at the projects that were licensed more expeditiously than perhaps might have otherwise occurred under those timeframes and compare them to projects that were licensed over a longer period of time. I think, but I don't know, that the answer that you would find is that the shortened licensing times did not result in any compromise of compliance with the law or any compromise on environmental protection.

I'm quite confident that's true for the Mojave Solar Project. The project is now under construction.

The other point that I would emphasize is that the urgency of the ARRA deadline and the Commission — I can't say strongly enough that Abengoa commends the

Commission for getting those ARRA cases, not just Abengoa's case but getting them all done within that timeframe. Staff and the Commissioners worked extraordinarily hard to do that and I think that's an important point that none of us on the development side of the table should forget.

But I think it's also important for the Commission to understand that one of the reasons and particularly the Abengoa case was accelerated is that the applicant was also under a deadline and knew that their opportunity to contest issues was equally constrained.

I know Staff has sometimes felt, you know, in a perfect world they might have done things differently or perhaps taken tougher positions on certain issues. I think it's important to remember that the applicants were also feeling that and the water issue is an excellent example of a situation where Abengoa chose not to accept staff conditions but it fundamentally disagreed with in the interest of meeting the deadline. And so the case moved more quickly because everybody involved was willing to compromise on issues and in order to get things done. And I think that spirit set an example that the Commission may want to take a hard look at.

With respect to the obstacles and challenges that the projects are facing, we have had a good working

relationship with the Energy Commission's Compliance Staff. For the most part it has gone quite well. There was one outstanding issue, it was really the only contested issue in the case, and it had to do with payments to the county for fire protection. And what the Commission did in a quite elegant way. I think the Committee — Commissioner Eggert and Commissioner Boyd and the Hearing Advisor Vaccaro actually came up with a solution that wasn't proposed by any of the parties. That was really quite elegant and it basically said we're going to impose a condition that says the parties, the county and the applicant will continue to negotiate post-licensing, try to reach an agreement. If you can't reach an agreement, we'll have an independent study of what the costs are and we'll basically create a way to bring it back to the Commission and resolve it. And that's exactly what has happened. We did do the independent study. They did come up with a number. And so that's sort of the one outstanding compliance issue. I shouldn't say it's the only one. There have been some other ones too but that's been the largest one. We are optimistic that we're going to reach an agreement with the county soon but there have been a couple of recent hiccups in the road, I would say, with respect to compliance issues and the main message that I was asked to say on that, and this is really the

only negative message, is that we think it's – and this gets to the point that's been made about certainty and how critical that is for the development of these projects, especially in California with all the moving parts. I concur with almost everything you've heard today.

Once you get a permit decision, you know, for better or for worse or for right or wrong I'm sure, you know, if I could go back and change decisions I'd change things in them. I'm sure staff would like to go back and change things in them. I'm sure interveners would like to change things. But once you get a decision it's that written decision that should govern. And that should be certainty with respect to financing and everything else that comes after that. That people aren't going to try to change the conditions. If you go through an amendment process that's one thing but interpretation of conditions or imposition of requirements that aren't actually in the decision on some occasions have been a bit of an issue for Abengoa. And those create a tremendous amount of uncertainty and particularly, and this is the last point that I would make, once you start construction your burn rate for money is tremendous compared – it's a very different environment with what the Commission sees in its permitting process; although there's money being spent there too.

Hiccups that occur, and hiccups is probably the wrong word, but anything that threatens to stop construction. Anything that threatens to upset financing once you're out there on the ground is an extraordinarily high consequence for these projects and for the Commission. And so the Commission's compliance office tends to sort of operate, for the most part, again very well but it tends to operate in an environment where the consequences are often higher than what people may perceive. We did run into a bit of a problem recently that the bad news is that staff issued a letter incorrectly claiming that Abengoa was not in compliance with its permit. Abengoa is under an obligation to report that with five business days to DOE, which would have potentially upset the financing during construction. It was a very high consequence situation. The good news is that staff corrected the problem very, very quickly when we brought it to their attention. In the end it's finding but those kinds of issues have potential consequences. Thank you.

COMMISSIONER PETERMAN: Thank you. There's a lot in your statement for me to reflect upon. I'll just make a comment or two but the Chair may want to say something since he's closer to the overall siting policy process.

I think you raised a good point with your

experience since ’78 and seeing how certain projects have moved more expeditiously than others. I guess I would – I think that type of evaluation is useful although I would caution doing it without really looking at not only the permitting process but also the compliance period because ultimately how these projects perform, no matter what their permitting timeline is, will depend on how they perform during the compliance period and a more expedited process does leave some more issues perhaps to be addressed during the compliance issue.

And I’ll also say that I commend the project developers and the staff who worked on those expedited timelines for ARRA. At least I know from the Commission perspective that meant a lot of weekends lost, evenings lost and unnecessary when it’s subject applicant or staff to that type of burnout, if you will. But notably it does show what can be done with that pressed timeline.

CHAIRMAN WEISENMILLER: I was going to note a couple of things.

First, coming out of that experience we did set up a lessons learned process and that is getting closer to surfacing at this point. Obviously, as we look at modifications to how we do business and fundamentally that’s what we’re looking for.

There are things that are relatively easy for

people to agree upon, like electronic filing, a no brainer. Sort of like a no brainer and things that are certainly much more complicated but we really intend to get into the conversation. But one of the real challenges — as you all know, we sort of picked a deadline and we met the deadline and we did what we had to do to get that deadline. That meant on some of the stuff where there were complicated issues basically said we will deal with this as part of the compliance process. And generally the compliance area, I'd say, it's one which made a very high priority in the sense that many of these projects had 300 conditions. Some of them were pretty straight forward. Some of them were pretty up in the air that somehow once you go into that construction fever and suddenly you've got all kinds of people running around trying to make sure that what was negotiated in the court room between your attorneys and the staff and everyone, what does it mean in the field in some way to make sure that, in fact, it's happening in a fashion that gets your project built but really minimizes the impacts on the environment at the same time.

The compliance stuff is probably one of our more difficult jobs, particularly in the sense, like I said, what did we really mean there or what happens when you go out in the field and you start finding stuff that you

didn't expect to find.

MR. ELLISON: That's absolutely right. And I think it's not the fact that you have to work out problems as you encounter them. You do. And I think the Commission Staff does an excellent job of that. And I think that applicants understand that. It's more the question of when you embark on the legal process of claiming non-compliance and what the consequences of that might be.

If I could offer one other quick comment and then I'll be quiet. On the issue of transparency, in my experience, for what it's worth, one of the things that makes the Energy Commission's process difficult for interveners, and I have represented interveners, and particularly for the public as interveners is the legalistic and complex and time consuming nature of the Commission's process. And I know that when we did the Sutter Project, that was a project that went to the Energy Commission in relatively ordinary time but it was also required a zoning change from the county. And the very same citizens that were opposing the project who I got to know quite well were involved in both processes. And the county's process consisted of a planning commission opportunity and a three minute opportunity to comment and a Board of Supervisor's meeting and a three minute

opportunity to comment. And the Energy Commission process was as you are familiar with. At the end of it, I asked these people which process did you prefer and almost all of them, to my surprise actually, said the county process. And the reason was that it was simple. They understood it. And they didn't have to invest so much in it. They could make their point, be heard and not have to devote a year of lives' to it. So. For what it's worth.

CHAIRMAN WEISENMILLER: That's certainly one of the things we're struggling with in the sense that for better or worse off when interveners come in they're more or less told you need to play Perry Mason to have an impact. Most of them don't do that very well. They can spend an enormous amount of time trying to do that or becoming utility system experts 101 in that process. And they don't particularly do a very good job in that but, you know, trying to figure out a way to deal with comment versus evidence. Again, make sure that public feels like they're being heard in a way which doesn't require them to go through all these contortions but still maintain the rigor of our process. And that's the challenge.

COMMISSIONER PETERMAN: Thank you. So, Felicia, I think we've really touched upon question two so people can feel free to comment on it but I ask you to move to question three because that's what we want. We want some

recommendations.

MS. MILLER: Commissioner Peterman, I have BrightSource on the phone.

COMMISSIONER PETERMAN: Oh. Apologies. Please.

MS. MILLER: BrightSource, are you still on the phone?

COMMISSIONER PETERMAN: Well, comment on, you've heard a lot being discussed by the panel and the Commissioners already so —

MR. WACHS: Keely. This is Keely from BrightSource.

COMMISSIONER PETERMAN: Keely, please comment on what you like.

MR. WACHS: So I thought that many of the comments I heard here today are similar to those that we would present as well. But I did have a couple new concepts.

First, I want to thank you all for inviting us to be on today's panel and Joe sends his regards. And he's sorry that he couldn't be here.

The first thing, just wanted to hit a couple of points on the first couple of questions. I think that capturing everything I've heard here today. I think one of the key things that's important in this process is to think long-term. And I think BrightSource — we've got

1300 megawatts of contracts with PG&E and another 1100 with Southern California Edison. Ivanpah is our first project and Ivanpah wasn't an ARRA recipient in the sense that it received the 1705 loan guarantee from the DOE. It was a $1.6 billion loan guarantee. I think it's the largest. It also qualified for the cash grant. In terms of thinking long term, you know, a couple of the things — why the project was successful, I think, were one is we did bake in a considerable amount of time for the permitting process. I think it took roughly three years to get through the joint CEC-BLM review process. And our experience has been while that was probably the longest permitting experience of all the projects it was also the first. And I think our feedback to the Commission would be we do recognize that there was some — lots of learnings going on and that the staff was genuinely committed to improving the process throughout. So we're grateful and appreciate of that. Nonetheless it did take three years and there were some circumstances with Ivanpah that I don't think necessarily applied to all projects but nonetheless, you know, was quite a process.

The other thing that we did well was we brought in good partners. So we had Bechtel which is, you know, a world-class EPC contractor. They're building the project for us. We also thought about impact so we not only

designed the project to be dry cooling using low water, low amounts of water, but also having a low impact design at a terrestrial level. The technology that we used did not have to significantly alter the landscape on the site. So it's a 3600 acre site and about, roughly, 20 percent of the site is needed to be graded and needed to use heavy civil work. The rest we're letting pretty much pre-exist as it was before we got there. We're cutting down vegetation but the vegetation is existing, co-existing, within the field.

I think that the other thing that we did fairly well is we look at transmission. I think transmission today continues to be a challenge, obviously. But we thought long-term in that process, worked with the off takers. Both PG&E and Edison on the issues. And I think that's been helpful at Ivanpah. We've got other projects coming forward to meet the contracts with our off takers but generally transmission is something that needs to be considered.

I think the last thing and this was touched on previously in the discussion here and it's kind of looking at proven technologies versus innovative technologies. And obviously we were conscious of the fact that we were going to be deploying a new technology at Ivanpah. Obviously, towers been around and other projects here in

the U.S. and globally but no one's done it at this scale before. So at every potential opportunity we try to de-risk a project so, again, that's bringing in world class partners like Energy and Google as equity partners. They could speak to the technology risk and assume some of that. We think that speaks volume to the process and the DOE itself went through — also went through a nearly four year review process of the project. That also helped to validate the technology. And we also proved it at our demonstration facility in Israel as well as the facility that we built for Chevron in Coalinga, California.

And then the other thing that we did at a technology level is that looked to components we were using in a project like this. And this is really important for the financing community. If you look at the boiler we use in our facility. It was low-risk because it was basically an off the shelf, conventional boiler that you would find in a typical power plant, just reversed inside out which boiler manufacturers are willing to provide warranties and guarantees on. As opposed to adding new technology risk to the boiler.

So you know in terms of challenges, I think the challenges of permitting are pretty well documented for the Ivanpah project. Today it's about 1/3 complete. There's 1700 construction workers onsite. They're

producing 500 heliostats a day, and that's two mirrors each so that's a pretty big process out there. The project's on schedule and on time. You know one of the challenges, again, is we did find more tortoises onsite then had originally been identified during the survey work.

I think the staff at the CEC did a very commendable job, kind of, working with us as well as the other interveners and stakeholders to find a good solution there. But it's been said in this panel many times before but it's ultimately there are always going to be surprises and challenges and risks at every project you go into. And I think that others put it very eloquently when they said finding a way to a solution is really important and I think that California is challenged in that way. I think there are so many interveners and so many stakeholders. I don't know if you can get around being process oriented but certainly that adds to the length and the risk associated with any project.

So I know that time is short and I know you want to get to question number three and so those are my prepared remarks. I'm happy to answer any questions you might have.

COMMISSIONER PETERMAN: Thank you very much. As we move to question three, which I'll turn to Felicia for,

specifically this overarching Workshop is about financing and so even though we're touching upon the experience of the ARRA projects, generally, would also appreciate you commenting on the next project that doesn't have ARRA funding. What did ARRA funding facilitate in terms of your project development? So, obviously, we've talked about how it facilitated and encouraged a more expedited timeline and that was viewed as valuable by project developers. Did it allow for cheaper debt? Did it make financing the rest or the remaining of the project faster? How would you go about this project without ARRA money going forward? Because we'll want to make sure that we capture those aspects as well.

So, Felicia?

MS. MILLER: We're moving to question three?

COMMISSIONER PETERMAN: Yes, please.

MS. MILLER: Okay. So what I think I'm going to do is I'm going to reverse panel and Keely, I'm going to give you an opportunity to answer question three. Do you have that question in front of you? Okay. He's done.

So, Chris, I'll let you answer the last question.

MR. ELLISON: Okay. Well, let me begin, Commissioner Peterman, by responding to your question. And I am not a financing expert but I do have some sense,

at least with respect to this project. I think that this project is a $1.6 billion project and a $1.2 billion cash grant. I think the answer to your question — I think in this case at this time that cash grant was very crucial to getting this project built. And I think it definitely made a difference. And I think part of the reason for that though is it was coming at a time when credit was very hard to get for these kinds of things because of everything else that was going on in the world economy.

MR. ARMISTEAD: You mean $1.2 in loan guarantee or grant?

MR. ELLISON: Grant. So the answer might be different at a different time. At other times in my career when banks were lending more readily, having DOE there to lend might not have made as big a difference as it did at that point in time. But that was the purpose of the recovery act. That was a big part of the purpose of the recovery act. I would identify it as a success in that respect.

And then very quickly with respect to what we can do at the state, federal and local level. I've already touched on a couple of things. I'm not going to repeat them. Abengoa would certainly support an increase in the RPS goal to 40 percent. That certainly would help. They would support a DRECP process that identifies viable

zones near transmission that can feed into the federal programmatic environmental impact statement and harmonize those efforts to give clear signals as to where these projects can be sited more readily.

At the federal level they would support an extension of the federal investment tax credit as well as the treasury grant or some form of treasury grant. And, similarly, to the DRECP, they certainly would support the BLM's PEIS process moving forward and concluding successfully.

And then, lastly, at the local level, the sort of additional fees we've seen imposed, for example, by Riverside are a problem and we would like to see that issue resolve.

COMMISSIONER PETERMAN: Thank you. That was a nice —

MR. WACHS: Felicia, it's Keely. I'm sorry. I was dropped earlier if you wanted me to respond.

COMMISSIONER PETERMAN: We thought you just were done.

MR. WACHS: No, no, no. Not at all. Are you kidding me? I'm never done.

[LAUGHTER]

COMMISSIONER PETERMAN: Okay. You're up next.

MR. WACHS: Okay. Thanks. Sorry. I apologize

for that but so echoing many of the things that Chris just said, I would add a couple.

One is, and echo one sentiment, which is the DOE loan guarantee program for Ivanpah. It was a $2.2 billion project and a $1.6 billion in debt provided by the loan guarantee was essential, it was critical to the project.

I think that if we hadn't had it what likely would have happened is that we would have financed one part of the project. It's a three plant project. We probably would have financed one of each of those projects separately and it would have taken much longer. Going forward our plan is to commercially finance projects now that the technology is built at scale and proven commercially but ultimately that depends on where the debt markets are and we would strongly encourage other ways of helping to fund these projects. They are capital intensive as well as other infrastructure projects in the state.

We think one way of doing that, I know there's been discussions around the California Alternative Energy Transportation Financing Authority. Looking at how private companies can issue tax exempt bonds, for example. I know some folks with the legislature as well as the Commission are looking at this vehicle in terms of helping to finance projects.

At a federal level 1603 cash grant program has been incredibly useful. ITC is extended through 2016 and I know that there's a dialogue going on about its extension and what type of, if any, extension there might be. That's another program that I think is critical to these types of projects.

So that's the additional comments that I wanted to make.

COMMISSIONER PETERMAN: Thank you very much.

MR. ARMISTEAD: I'll keep mine very short. Just to differentiate, I do think that the loans guarantees – while the business that we're in, which is wind, is the more mature technology it's really not for the mature technologies. Even during the day when we had the liquidity crisis it wasn't like we needed the loan guarantee. It was really the liquidity around the tax situation. They created the problem. So the extent that the Commission sees value in new or innovative technologies and maybe not even around generation. Or batteries or whenever you're trying to do big capital projects that require a long term to repay that's in direct conflict with implementing new technology. The risk in supporting things like that is that you can up with fairly public issues when you bet wrong.

If you want to see new types of things I think

that's where the guarantee type situation, whether it's from the federal or state, becomes valuable.

As it relates to – speaking as someone who does a lot of wind, if the Commission wants to – one of the big issues is whether or not there's going to be compensation from the – under the PPA in the event that the federal incentives are either there or not there. What this creates right now, you know, with – when basically there is not awareness that you have an on/off nature of the federal side, it creates added pressure on that balancing act of permitting. And, so, if the Commission, which we would very much we'd see, is that the 33 percent is not considered a "Thank goodness we got there. We're never doing another megawatt." And I think it's going to take some direction to see that that is not the case. That it really is not just a floor and that there's a chance for more uplift. The rest of it, I agree with the other things so I won't say again.

COMMISSIONER PETERMAN: I just want to ask one clarifying question. You raise the point about the uncertainty around the PTC and how that's embedded now in the PPA arrangement. So I thought you were going to go maybe somewhere else with that. That the state government could somehow provide some certainty around that –

MR. ARMISTEAD: Or at least –

COMMISSIONER PETERMAN: Backstop that risk but –

MR. ARMISTEAD: Provide guidance to the – I don't know if it's the CEC. And that is also one of the always tricky things. It's hard to know if it's the CEC, the PUC, the – if you don't know the various areas but if there's a target that's put out there, our contracts – I mean, take for instance right now. The utilities are satisfied for a number of years. If you're going to run an RFP right now, you know, does that assume that there's a tax credit or does it assume that there's not? Or is there some way of effectively getting the best project that's available without having to find the person that's most willing to bet that there's going to be something there when there may not be.

COMMISSIONER PETERMAN: I see. Thank you.

MR. HOYLE: Yeah. And just to add to that a little bit. You're basically asking the developer, a wind developer in this instance, to post say $100 / kW, whatever it is, which would be about $10 million on a 100 megawatt project. And you're essentially taking PTC risk. And so that's a risk that some people aren't willing to take.

MR. ARMISTEAD: And you may not get the most qualified or best project. You may end up just with the person that's willing to gamble the most. And that's

maybe the right outcome, too.

CHAIRMAN WEISENMILLER: Yeah. Well, actually, on some of the solar projects, my understanding of the PPAs is that they had contingents on what happened if they got cash grants or loan guarantees. What happens if they didn't in the pricing structures?

So you could, again, I don't know if the utilities would negotiate with you on it but at least there's some precedent for that type of contingency.

MR. ARMISTEAD: There used to be that. I would say that they've specifically moved away from that. At least they have in the most recent dialogues. I don't know if that changed in the recent solar awards but I know that the feedback came is that this is not a risk that we have to take so therefore the developer should take. And I do think that, in this instance, biased some of the awards toward solar because the incentives existed for a longer period of time for solar than they did for wind.

MR. HOYLE: And I have direct experience with that recently and from a legacy perspective as well.

Obviously support California supporting the federal Production Tax Credit extension is a biggie. We have, as a backlog, nearly 400 megawatts, another $800 million of investment on top of the $2.85 that we've already – the $2.85 billion that we've already invested.

So that's obviously a critical issue for us and any support would help.

I think looking a little bit longer term and talking about some other things, transmission planning I think is pretty key. Long-term transmission planning process I would definite it as sort of broke right now. I don't think there's a lot of incentives right now for transmission owners to do another transmission project and if they wanted to today that's definitely a long road to go.

In addition to that, transmission queue process. I'm sure there's going to be another push here to reform the transmission queue process because some of the people in the initial clusters have a lot of money and they're either going to monetize that or not. And when it comes due for them to put in more money I'm sure they're going to what to reform it.

From our perspective some of these later clusters, it just doesn't make a whole lot of sense to participate in that process. Just because how are you going to get through it, especially with all of these projects in front of you that, quite frankly, we don't deem to be viable.

And so that leads into project viability, I know it was talked about a little bit earlier. I realize that

at least the IOUs have a different view of project viability. But what we see in the market is that there are some speculative projects that keep clogging up resources, not only from the transmission side but from the agency side and just generally in the permitting process. Don't have an answer but it's definitely speculative.

So the last thing that I would just like to talk about. Obviously, seeing an increase in the RPS would be something that we'd be supportive of. Other things, you know, to make technology a little bit more – the incentives, a little bit more agnostic. I mentioned that we'll be paying $31 million a year in property taxes. We don't have a property tax exemption and so if you're without PTC's, potentially, that would be a nice thing to be able to put on par with other technologies in addition sales tax. So far we've paid $178 million in sales tax and it is pretty typical at least in a lot of the other states that we do national development that there is some sort of sales tax exemption that is typically provided.

And the last thing, John Marciano talked about it a little bit from Chardbourne on the previous panel, another potential way, just brainstorming, is that other states do have tradable or refundable call them state Production Tax Credits or similar so you don't need to go

through what you need to go through at the federal process to monetize them. You can actually sell them for cents on the dollar to those that have state tax nexus or have a state tax appetite.

COMMISSIONER PETERMAN: Great. Thank you. Scott?

MR. BUSA: Again, and I'll apologize, my expertise is going to be that certainty around providing some certainty in the permitting process. So I'll just give you a couple of quick things we can develop more.

COMMISSIONER PETERMAN: Sure. Thank you.

MR. GALATI: For one thing is early decisions in a permitting process. To develop a scope upon which projects are reviewed here at the Commission and, again, I'm speaking here at the Commission because this is something that works very well with the counties.

One of the things that I know from doing a couple of projects in Fresno County is they really build upon the last project. So if you're a developer and you see a project get a conditional use permit through an EIR and you propose something similar to those conditions and similar to that mitigation they start from there. And they just say what's different about this project and that's what they evaluate. The law allows it, encourages it but that's not what happens at the Commission. And so

an early decision of scope applications who come in and hit 90 percent of the mitigation marks up front that process should be far different than applicants who come in and don't commit to anything. So I think that's very helpful.

The other thing that I think would be very helpful in, again, continuing with the desert resource energy conservation plan some of us think that would have been great if we had started that 5 or 10 years ago, I know all of us would in the room, so would know when you're siting a project where to site the project. So we're hoping that that will provide some level of certainty that we hope you can pick a better site in the future.

And then, lastly, I would say that I've gone back and forth on this but I've weighed the relative merits to the state from my perspective. There still is a prejudice against somebody filing an application locally, federally or at the Commission if they do not have a power purchase agreement. Somehow if you have a power purchase agreement you're real and somehow if you don't you don't. But I think that a lot of those power purchase agreements, and I'd agree with my colleague to the right here, that some of those power purchase agreements that people entered into before they filed a permit application,

before they understand the transmission costs have artificially driven the price so low that at the end of the day you're going to process a project with a PPA that was, you know, entered into a long time ago with no idea. Everybody's – and so what you have is you have some people gambling that the same thing that happened before – a 2007, 2008, 2009 vintage PPA is a high price and a 2014 PPA will be a low price. But I think that that's artificially low now, especially for PV. I also agree that without some outside funding and cheap financing I don't know how you can build, and a lot of my clients do not know, how they can build a project a $0.07.

So I think that even though the costs are down it's just there's no margin for equity and you have to find extremely cheap debt. So I think that somebody who filed an application without a PPA actually should be rewarded and get that project processed. Beucase it's not cheap to do that. That's all equity at-risk money but then when they can bid in they have an idea what the project costs. They have an idea what their transmission costs are and then you get something that's real. So I think that's something the Commission can deal with directly.

COMMISSIONER PETERMAN: Thank you. Thank you for offering up some additional suggestions from the

previous panelists. Scott B. you want to bring us home?

MR. BUSA: Sure. See how long winded I can be. To first answer, Commissioner, your questions on tax incentives and loan guarantees.

I can tell you three of them. We'll talk about the loan guarantee, the 1603 grant and the property tax exemption. All three of those are built into our PPA pricing when we went forward with our previous projects. And so the beneficiary of this is the ratepayers of the California utilities. So they do help and they do make a difference and it's not money in our pockets.

And another thing two, I just want to reiterate or clarify that all of these programs really don't cost the public any money onceover. The DOE loan guarantee doesn't cost the public any money unless the project were to fail, which is a different thing. We're talking about successful projects hopefully.

The 1603, the cash grant in lieu of the tax credit for solar, the tax credits were authorized anyway and the companies were going to get those so the conversion to cash really didn't make any difference in that and so we're talking about a lot of money flowing here but it's not coming out of the ratepayers pocket. Actually, it's helping the ratepayer with a lower PPA price in the end.

And, just to mention too, that's a very important incentive to our company and to companies like us that aren't necessarily aren't able to take full advantage of a tax credit but, you know, the cash is a different story. So even though it's the same dollar break in the end it is important and has helped us bring projects forward.

And the property tax exemption, I mean, honestly they are — that's money that's not going into the local or state coffers. However, that is built into the PPA pricing as I've said before too. It's an annual operating expense that's very helpful to count on not having that and we were able to price with more certainty going forward. So all important, you know, whether we make it without one or the other, it's possible. But I think they're all important programs.

A couple of things on what actions state, federal, local need to facilitate development of large-scale renewables. I'll mention two. One, and they both directly deal with the Commission, is doing or could be doing. We developed several projects on land with the BLM, whether they were an interconnect or the actual physical, land, the property. Or the project was going to be placed on, in the beginning, at least in 2009 and 2010, there was hope that the Commission would be able to work

closely with the Bureau of Land Management. A lot of planning went on together. Unfortunately, kind of in the middle of our process with Genesis there was what they call the divorce where there was this desire for the Commission and the BLM to kind of do their own thing and go separate ways.

Of course that doubles the amount of work the applicant has. It doubles the amount of permit conditions, even though they're almost identical. It doubles a lot of things that I think if there was a way to not have both a CEQA and a NEPA in full process that would be very beneficial and helpful. So anyway that the Commission can look to working with their federal partners in reducing the amount of hoops we have to go through. And this is not only the permitting stage but through the many years of operation too that would be helpful.

Right now we've got BLM staff and Commission staff watching what's happening with the Genesis Project as well as the DOE guys. We've got a lot of eyes all trying to accomplish the same thing and a lot of costs that are duplicative because of all that.

On the flip side of that, I'll go to the local level. Currently we're processing a CEQA application on our McCoy Project, which is an up to 750 megawatt photovoltaic project down in Riverside County. They too,

and this is on BLM land for the most part. There is some private land involved. They too started the process together. We were about nine months into the process of doing a joint EIR/EIS and the worst came about there too.

A good intentions to start with but the county, unlike Kern County, I guess this is not quite as cooperative or they actually pulled our conditional use application after — within weeks of issuing a draft EIR. And a lot of this revolves around some things that were mentioned here that has to do with a tax issues that the county is trying to resolve and place on local projects in the county. It has not worked very well, in my opinion. Several PV and solar thermal projects have been able to work with other counties on what we call the sun tax that Riverside County has imposed but Riverside County has kind of gone a step further with that. It's really created a problem with both the permitting aspect and the moving forward with that project.

I bring that home by saying I would encourage and hopefully would love to see the Energy Commission have jurisdiction — or have the ability to have jurisdiction over photovoltaic projects in addition to solar thermal or thermal projects in general. I know that a lot of developers don't necessarily agree with me on this point. You know, the Energy Commission has a reputation of being

a pretty tough place to make things happen at but we have experience with both the Commission and the County process. And for it to be voluntary, like with four places that we aren't getting the cooperation from the county, I'd love to be able to come to the Commission with my project and have you guys be my CEQA lead on that. So that's something that I think the state could work on that would broaden a developer's options but it might include wind too. And I think voluntary is a key part of that and I hopefully will be able to see the Commission more often in the future with some photovoltaic projects.

COMMISSIONER PETERMAN: Scott, thank you for that. Before I turn to the Chair for some final comments, in the interest of time and the growing crowd for what I believe is our next speaker, I'm going to thank all the panelists for all those excellent comments. We welcome your written comments as well. A lot to think about. This has been very valuable as well for me to have this discussion outside of the siting cases where we normally see each other. Thank you also to Felicia Miller for her moderation as well as her introduction to this panel was very helpful, and for coordinating everyone. Chair?

CHAIRMAN WEISENMILLER: Again, I'd like to thank everyone. I would note for Scott's benefit we did have a lessons learned workshop on that actually, a panel on the

various efforts of the locals, the state and the feds all to do joint documents. And people talked about where thing worked or didn't work or at least the challenges there. So that's certainly – it was a very interesting exercise. Again, thanks everyone for your participation. Looking forward to your written comments. And obviously we're looking forward to the next panel. Thank you.

COMMISSIONER PETERMAN: Thank you. And as our panelists leave I'll just, in order to connect people, which is what Commissioners try to do – our next presentation is of some work being done by the Executive Fellows. The Fellows are post-graduates that are currently working within state government and, hopefully, they will choose to continue their careers with state government but if not talk to the panelists who were just leaving who are giants in private industry who can promise you perhaps more money but maybe not as rewarding in experience.

[LAUGHTER]

COMMISSIONER PETERMAN: And if you want to hear where the next generation is going with their thinking listen to this presentation because they will already have familiarity with government at this early stage of their career, which is quite important as you noted. So Suzanne?

MS. KOROSEC: All right. Our final presentation is the result of a project that was performed by the Executive Fellows for the Energy Commission and the Governor's Office of Planning and Research 18 Fellows are selected and placed in different California state agencies for a 10 month period where they learn about state government from their individual experiences and mentors as well as through their shared professional and academic experiences with their colleagues.

Six of these follows were tasked with researching 14 diverse renewable generation facilities and the barriers associated with their development. So we wanted to acknowledge all of the fellows that worked on the project and their mentors.

We have: Ashley Fabrizio, Department of Finance, Mentor: Ana Matosantos, Director; Anita Ladher, Office of Edmund G. Brown, Jr., Press Office, Mentor –

COMMISSIONER PETERMAN: Can I just interject? Can you just raise your hand while she's calling out your name so we at least know who you are? Do you want to just start at the beginning? We have Ashley?

MS. KOROSEC: We have Ashley. Anita Ladher. Okay. Office of Governor Brown, Press Office. Your mentor was Evan Westrup, Deputy Press Secretary. Amy Nabel, Office of the State Treasurer with the mentor of

Tricia Wynne, Deputy Treasurer. Bartek Sudol, California Volunteers, Office of the Governor. Mentor Karen Baker, Secretary. Andre Lee, CalPERS Investment Compliance and Operational Risk Division. Mentor is Carol Baldwin Mooday, Senior Portfolio Manager. And Jamie Ruddy from the California Health and Human Services Agency. Mentor Diana Dooley, Secretary. So Ashley?

MS. FABRIZIO: All right. So I'm Ashley Fabrizio from Department of Finance, Executive Fellow and I would like to first start by thanking Sandy Goldberg at the Governor's Office of Planning Research and Kevin Barker at the Energy Commission and then, I didn't see them, but Sekita Grant and Dr. James Reed, also with the Energy Commission for their advice and their help throughout this whole project. They were absolutely crucial with their contacts and their vast body of collect knowledge. So thank you to you guys.

And, so, the purpose of this project was to learn more about small scale distributed generation in California. The Governor's Clean Energy Jobs Plan calls for 12,000 megawatts of distributed generation by 2020. And Senate Bill 2X set a goal of 33 percent renewables by 2020.

The state also has an obligation to help stimulate economic development and job creation,

especially in those areas hardest hit by the recession. We are also more familiar with large scale power plants, which have a long history of being established in the state. And, above all, we wanted to learn if there were common hurdles distributed generation projects faced as well as identify any issues not on our radar that need more exploration.

We interviewed project developers, local officials, utility's staff as well as reviewed public documents and news reports. And our framework was based on those key milestones a project must meet to come to fruition from procurement to siting and permitting, the interconnection process and achieving an agreement and then financing the project.

So the term distributed generation can mean many different things. We were looking for a diverse group of projects and technologies that would all fit under this umbrella. So some distinguishing features were: renewable portfolio standard eligible projects of 20 megawatts or less, wholesale as well as self generation projects, different technologies like solar PV, wind, solid fuel, biomass, biogas projects and fuel cells. And then within solar PV itself everything from fixed ground mounted single access, dual access and rooftop installations. And then different procurement mechanisms whether it's on

public or private land and then finally scale. So it's a big difference if it's a few hundred kilowatts versus 20 megawatts.

So for this — I'll now go through our 14 case studies and touch on the highlights of each study, one or two points per slide. If you have specific questions, please feel free to ask during the question section at the end of the presentation.

So first up is Recurrent Energy's Kemmerer PV facility. It's a 1500 megawatt ground mount fixed single axis installation on 115 acres in South Sacramento County. And it's one of Recurrent Energy's four projects under SMUD's feed-in tariff program. And the feed-in tariff program was one of the state's biggest DG procurement efforts. It was capped at 100 megawatts and fully subscribed after a few weeks, after the ARRA announcement. And Recurrent Energy, in fact, locked up 70 percent of the hundred megawatt capacity with its 70 megawatts total over all four sites in South Sacramento County.

Then, in this picture here, U.S. Secretary of the Interior Ken Salazar and Governor Brown signed a memorandum of understanding in January 2012 at the ribbon cutting of the nearby RE Bruceville, a very similar project to this one. And this was also a solar PV project.

And the purpose of the MOU is to direct California agencies and the Department of Interior agencies to take the necessary actions to further the implementation of AB 32 and Senate Bill 2X, and also the Secretary of the Interior's Order 3285A1 in a cooperative and timely manner.

So next step is GreenVolts. This is a utility scale solar project in Byron, California. It's a three megawatt dual access tracking and concentrating PV system. GreenVolts was one of the first small scale developers to respond to an RPS solicitation and successfully negotiate a contract. Most successful projects are large scale. This project appears to be a flagship project for a new wave of community scale DG projects.

Then the McHenry Solar Farm in Modesto is something of an outlier in that it is a 25 megawatt project and it's not — and so it's technically not under the Governor's 20 megawatt limit for a project to be considered distributed generation project. And we included this project in an attempt to shed some light on whether a 25 megawatt project faces the same experience and issues as a 15 or 20 megawatt project. And from our limited research this project appears to have the same experience as somewhat similar projects.

And the Aerojet PV installation is a six

megawatt project on 40 acres of private land on the Aerojet Property in Rancho Cordova. The facility is a U.S. EPA superfund site, which is a highly polluted location in which the cleanup is monitored by the EPA. So this is a company really that's trying to clean up its groundwater and wanted to use renewables to help power that process. So Aerojet has solar power purchase agreement with Solar Power, Inc., which is an agreement between a developer and a customer as opposed to between a developer and a utility.

So this third-party aspect makes it unique among the projects that we studied. And SMUD is also financing the project. $13 million of the project's $20 million cost over 10 years.

Then the Southern California Edison ProLogis Rooftop PV project is an 8.6 megawatt project over 27.5 acres of rooftop owned by ProLogis. It's on an industrial distribution center in Rialto, California and it's the largest rooftop application in California and it's online. It came online in September 2011. The project is part of Southern California Edison's solar photovoltaic program, which includes projects up to 10 megawatts.

The Sonoma Mountain Villages 2.3 megawatt PV facility is on 4 acres of rooftop in Sonoma. One highlight from the study is that the developer financed

the 1.6 megawatt upgrade with a $1.6 million loan from the Sonoma County Property Assessed Clean Energy Program or PACE program, which is a method for financing energy efficiency improvements for homes.

This project also received financing from the federal ARRA grant program in lieu of a tax credit, a grant in lieu of a tax credit, which reimbursed 33 percent of the project's total cost.

The China Lake Naval Station PV Project is 14 megawatts on 118 acres of federal land. This project was limited in its size by the minimum load of the facility and because it was too big for net metering. As a public entity the Navy could not take advantage of federal tax credits so it worked with a third-party developer. This was SunPower Corporation. And this corporation was able to qualify for a tax credit and pass the savings on to the Navy through its energy pricing.

The Buena Vista Biomass Power Facility is an 18 megawatt woody biomass fired facility on 50 acres in Ione, California. This is a repower of an old coal facility that closed in 1999, which resulted in many jobs lost in this small community in inland California. In repowering this facility a significant effort was made to hire local labor for construction and commercial service jobs. So this is an example of an advantage DG has for booting

local communities. The facility also received a Wildland Fire Management Grant from the U.S. Department of Agriculture for $2.5 million. This was also an ARRA grant.

The SPI Susanville Cogeneration Facility was a 13 megawatt biomass solid fuel plant. It was operational from 1985-2004. There have been a number of efforts to bring the facility back online but it has thus far not been operational. There are a number of hurdles, including availability of fuel to burn and also financing issues. But this is a facility to watch going forward. It was recently acquired in November 2011, also intended to be brought back online soon.

The Teichert Aggregates Wind Turbine is a 1.5 megawatt project on .25 acres at the Teichert Aggregates' facility in Vernalis. This installation made use of the Public Utility Commission's self-generation incentive program which provided approximately half of the project's $4.5 million cost.

The Southwest Windpower Skystream 3.7 model is a personal wind generator that is used on the residential level. We did not look at any particular installation but it looked at the California picture as a whole. Most of these units are installed on residences in rural areas that have wind potential. There have been 87 systems

installed in California since 2007 and these installations are eligible for a U.S. federal tax credit that covers 30 percent of the installed cost. But this tax credit is set to expire at the end of 2012.

So the Tank 7 In-conduit Hydroelectric Project was proposed for 400 kilowatt installation for El Dorado Irrigation District. And this project is currently not going forward. The power purchase agreement expired and there were issues with financing the project.

The Sonoma County Farms to Field Project is a 1.4 megawatt chicken manure fuel cell on 5.4 acres of Sonoma County – it's for the Sonoma County Water Agency. And the fuel cell makes use of biomethane gas from dairy and food processor waste that is processed in bio-digsters. And this project made use of a $3.4 million grant from the Energy Commission's Alternative and Renewable Fuel and Vehicle Transportation Fund.

And, finally, there's the Recycling Plant One Fuel Cell that's a 2.8 megawatt fuel cell powered primarily by renewable biogas. It's placed in a water treatment plant operated by the Inland Utility Empire's utility agency in Ontario, California and it's been online since September 2011. This project received rebates through the Southern California Edison Self-Generation Incentive Program.

So that is the summary of our 14 case studies. And I will conclude with some very limited recommendations. Any further analysis in tracking the state of DG in California might look for the data gaps and the types of projects we studied here as well as key issues. And further tracking might seek to identify reoccurring challenges faced by developers in bringing these projects online. And further analysis may also identify those issues that can be readily addressed by regulatory agencies such as streamlining the approval process, which we heard a little bit from from the last panel.

So I would like to thank you all for your time, my teammates and I. I can now take any questions that you have and we welcome any recommendations for further research and analysis.

COMMISSIONER PETERMAN: Thank you. That was a whirlwind tour. I couldn't really keep up with turning my page but you handled it very well in presenting that information.

I will say that we're not going to need the 15 minutes for our closing remarks so I'd like to take a little bit more time to ask some questions.

How about you just come to the dais and have your teammates as well so that you can answer specific

questions that we may have for you.

Now as you're coming up I will say that this presentation's very interesting and really the summary you provided so far just in the PowerPoint highlights a lot of the issues that we've had to consider today as well as in a number of our workshops that you've touched upon.

Perhaps the Chair and I will use the opportunity as well to come highlight some of the common themes that we're seeing in general with renewables that you've highlighted in each of your case studies.

First, we had a clarifying question. Who worked on the GreenVolts project?

MS. NABEL: That was me.

COMMISSIONER PETERMAN: Can you tell us why the projects on hold?

MS. NABEL: So they discovered kind of partway through construction –

COMMISSIONER PETERMAN: Oh. And you need to speak into your mic.

MS. NABEL: They discovered partway through construction that there had been a decommissioned Shell Oil pipeline running through the project. And I think they had known about the pipeline but there was an oily substance that was supposed to be completely decommissioned. It was supposed to be completely clear.

And so they discovered this oily material and they're currently working with Shell on kind of further steps as well as the utility. But they haven't been able to clean it up fast enough to be able to get up and running.

COMMISSIONER PETERMAN: Thank you. And a point that was touched on by an earlier panel – oh, please.

CHAIRMAN WEISENMILLER: Actually, I was just going to ask each of you who speak to identify yourselves for the Court Reporter.

MS. NABEL: I'm Amy Nabel. I'm an Executive Fellow at the State Treasurer's Office.

MR. LEE: (Indiscernible)

COMMISSIONER PETERMAN: Oh. You only have to do it when you speak.

MR. LEE: Oh. Okay. I'm sorry.

COMMISSIONER PETERMAN: The first time around. But it's useful. So one of the questions that was raised by the previous panel was the issue about timing and having these timing deadlines and having to considering how long the PPA process takes and the permitting process, how many of these steps are done in parallel. Just wondering in your conversations with the developers if they – if you got a sense that they pursued each of these tasks in a certain order. Did they comment on the timing uncertainty around some of these? I think there's one

project that might have been delayed because the PPA was cancelled.

MS. FABRIZIO: (Indiscernible)

COMMISSIONER PETERMAN: Is your mic on, Ashley? So to turn your mic on you have to press the push button in the center for future speakers.

MS. FABRIZIO: Ashley Fabrizio, Department of Finance. The project that was – the PPA expired; it was the Tank in-conduit project. It didn't get the financing in time so it was passed the 12-month limit and I think the 6-month extension as well on the PPA. So the project, as far as we know, is not going forward.

CHAIRMAN WEISENMILLER: Did you get a sense of what the real issue was on financing? So just a bad market or bad project?

MS. FABRIZIO: Who did? Was that yours? Was that your project? The in-conduit project? Do you –

COMMISSIONER PETERMAN: Now's the time to say your name.

MR. LEE: So my name is Andre Lee and I'm at CalPERS Investments. Can you repeat your question, I'm sorry.

CHAIRMAN WEISENMILLER: Yeah. Well basically the project didn't happen because it couldn't get financing. So the question becomes, in my mind, what were the issues

in financing? If you know, and if –

MR. LEE: Yeah. To the extent that we were able to figure it out. What happened was that the district – the irrigation district just didn't have the funding necessary to complete it. I believe that they had enough money to get about halfway. So right now I think where they're at is they're looking at private funding options and I believe that it would have the added benefit of also being eligible for certain incentives from the federal government that the irrigation district would qualify for necessarily.

CHAIRMAN WEISENMILLER: Sure.

COMMISSIONER PETERMAN: Any other comments from the panelists about timing?

MS. NABEL: Yeah. This is Amy Nabel, again. For the China Lake case study the energy manager for the China Lake Base mentioned that a big issue in terms of timing, in terms of kind of getting the PPA up, was that because they could not have the agreement with the – the interconnection agreement with the utilities ahead of time because they basically needed to have all the information about, you know, construction, the PPA. They needed to have that all before going to the utilities that that made the whole process more difficult because then they couldn't go to their private developers and say, "Oh. We

have the interconnection agreement." So there was a bit of a chicken and egg problem there.

CHAIRMAN WEISENMILLER: Yeah. We've often heard from the developers that interconnection is a key problem. I don't know in terms of each of you as you worked on the project what was the role of interconnection on your specific project?

COMMISSIONER PETERMAN: And did the developer speak to interconnection as a challenge when you spoke to them?

MS. NABEL: Yes. I didn't – I don't know if that was an issue with GreenVolts, which was my first case study. Definitely in the China Lake case study it became an issue where there wasn't necessarily a standardized process. That was their – the view, from the China Lake perspective, where they really kind of wanted a clear process of here are the documents you need to give us and this is how the decision will be made. There was kind of a lot of back and forth where sometimes what they delivered was good enough and then they would resubmit those same documents and then they would not be enough information. So there was a lot of confusion with the interconnection process. And that was a big issue of concern.

MS. FABRIZIO: This is Ashley Fabrizio with the

Department of Finance. The Buena Vista Biomass Power Facility, that one, they have an interconnection agreement with PG&E but they have a PPA with SMUD and so one interesting thing is SMUD uses the PG&E interconnection lines because the site and Ione is south of its distribution area. So that's one cooperation, I guess, between these utilities.

COMMISSIONER PETERMAN: I actually have some follow up questions about the Buena Vista Biomass facility, unless anyone else wanted to comment on the first question.

MS. FABRIZIO: No, we're okay.

COMMISSIONER PETERMAN: Okay. Thank you. So this is your case study, Ashley?

MS. FABRIZIO: No. Whose was that? Oh. It was Jamie's. She couldn't be with us today.

COMMISSIONER PETERMAN: Well, I'll just offer a comment on this one. This sparked the attention of both myself and the Chair because in the course of these Workshops we've been talking about what opportunities there are for distributed biomass. Oftentimes the focus has been on solar PV but we've heard from CalFIRE and the U.S. Forestry Service and particularly communities in Northern California about the not only the energy opportunities from biomass but also the potential for

reduction fire hazard and that fire hazard can lead to problems with transmission lines and ultimately more issues related to climate change and greenhouse gases.

And we had our first workshop looking at the benefit of renewables and particularly how do you monetize some of these none energy benefits. Something like fire hazard reduction isn't directly tired to energy but it is an important benefit for the state.

So I was interested to see this note here that that project received Wildlife Fire Management Grant of $2.5 million because that's quite a significant amount and we're trying to figure out what are these other avenues for revenue for these projects. Particularly, I think, this one highlighted the job opportunities in the area and we've heard, especially from those communities, how hard they've been hit by the reduction in timber sales and such in the area. And how these energy opportunities are pretty valuable. So thanks for including that one.

CHAIRMAN WEISENMILLER: You dealt with a variety of projects. A variety of technologies. And I guess part of what I was trying to get was your takeaway, which was the most interesting or exciting from each of your perspectives'?

COMMISSIONER PETERMAN: And what if anything surprise you?

CHAIRMAN WEISENMILLER: Yeah.

MS. FABRIZIO: I'll start. Ashley for Department of Finance. One of mine was the Aerojet Installation and so that was very interesting to me because it was a very close collaboration with the U.S. EPA and this private company, Aerojet and with Solar Power Inc. as sort of this third party going in between. I found it interesting that just the fact that they worked so closely together. That Aerojet was willing to try to power its ground remediation, ground water remediations, system with renewables. I think that hopefully in the future other private companies will try to offset some of their energy use with this. And it seems — I'm not sure if there was an incentive from the U.S. EPA to find a solution like this to power some of its required remediation programs on a superfund site like this one was but it was certainly a sort of win-win-win situation for the company and the federal government and the environment on that one.

COMMISSIONER PETERMAN: I'll just add before we have the next speaker that — when we had our workshop on location of renewables and preferred locations, we had some representation from EPA and there was a nice synergy amongst everyone to talk about how do we maximize opportunities on degraded lands, superfund lands and so

this is an example of one of those projects.

MR. SUDOL: This is Bartek Sudol. I'm with California Volunteers. And one of the cases that I worked on was a fuel cell in Ontario, Canada. And that was an interesting case because of barriers to entry for purchasing for getting such a facility started on existing land is much lower than anyone else.

Obviously the power with such a cell is much lower than other installations but seems to be a lot of people do the same thing. It might actually add up to a significant number. So was very excited to see that as a technology, that mature and ready to be deployed and it's a commercial product so hopefully in the future more companies will get that out on the market.

COMMISSIONER PETERMAN: Thank you —

MS. LADHER: Anita Ladher with the Governor's Press Office and I worked on the Sonoma County Farms to Field Project and what I found most interesting about that was actually how much it had been delayed because of difficulty in getting permits from the federal government in particular the Army Corps of Engineers. So that was what the Project Manager in Sonoma County kind of wanted to talk to me about every time I had interactions with him. It was a small project but I found that to be the most interesting part of it, the delays. Because it was

supposed to start construction over a year ago but as of now it still hasn't.

MR. LEE: Hi. So this is Andre again from CalPERS Investments. I found the Solarphotaic Program the SGVP program that Southern California Edison has been working on. So the really interesting. The one that we did the case study on was their Rialto Installation. Basically the entire program has to do with putting installations on the rooftops of big, industrial distribution centers in the Inland Empire. And the reason why I thought it was interesting, you know, a lot of kind of what has been holding solar back is, you know, the land issue. A lot of times the land that these installations are good for, you know, it's agricultural or it has other purposes so having rooftop installations I feel really have the benefit of not taking up space that could be used for other purposes. What we found is that although the Rialto site was completed successfully one thing that came up again and again was the issue of funding. Is that the costs were higher than they estimated. I do not believe that they were able to complete the SGVP as a whole as they had intended at the beginning and so they modified their plans substantially now. Yeah. I found that case study probably the most interesting.

COMMISSIONER PETERMAN: Andre, your comments are

well taken. We've heard in a couple of our workshops some concerns from those who are in the Central Valley about the conversion of perhaps prime agricultural land for solar PV development and just the competing needs for the land. That's a very live and relevant issue for us.

MS. NABEL: I really enjoyed seeing the contract actually between my – I had two solar projects. Although the GreenVolts project isn't up and running they have several other projects and they have kind of a similar model where they try to put their sites very near to transmission lines that are already in place. Whereas if you compare China Lake, which is in prime solar land. They're on the border of the Mojave but, I mean, they could have built a much bigger site but there's this problem of the lack of transmission. It was really interesting to see the kind of – that you would have two very different projects up and running simultaneously within the state. You've kind of got grant, siting and transmission problems. The sun isn't quite as bright but it's right next to the transmission. And to just see them both running simultaneously was really interesting.

COMMISSIONER PETERMAN: I'll note that the Energy Commission was one of the early funders of GreenVolts and they do have a unique model. They with their turnkey model. And it just shows you the different

business propositions there are in solar.

Any further questions?

MS. NABEL: That PIER grant in our case study –

COMMISSIONER PETERMAN: I did like how many of them did note that we funded it. It was nice to look through our history and see the impact the Commission is having.

CHAIRMAN WEISENMILLER: Yeah. I think one of the things we hear often is that location really matters for projects. And, as you said, there are some that have a very good site, that have very little permitting issues and some that turn out to just have horrible sites and take forever to permit. I was wondering, you know, in terms of location and obviously it's sort of the cliché in real estate, it seems to be the real cliché in power development.

So I was wondering again as you went through the projects if any of the sites just jumped out at you at the end going, "Oh my god. Why there?" As opposed to, "That was really smart from the start."

MS. FABRIZIO: Ashley Fabrizio, Department of Finance. With the SPI Susanville Cogeneration Facility one of the – it's no longer online. It's been offline since 2004 and part of the reason was connected to a sawmill. And one of the reasons it went offline is

because there were other sawmills and Sierra Pacific Industries sawmills in the vicinity. So it's prime placed right in forest land, it could clear any kind of underbrush that they needed but the cost of trucking in the solid mass biofuel, these big wood pieces, was prohibitively expensive because with so many other cogeneration facilities. So maybe at least in certain areas there is maybe a saturation of the market with cogeneration facilities. But in the example of the BVP Place in Ione that facility was — it was something to burn all of the woodchips and sawdust and underbrush was really needed in that area and so that was kind of a very unintended benefit of the —

CHAIRMAN WEISENMILLER: When we originally started the cogeneration program in late 70s a lot of the really prime sites were the pulp and paper wood places. They basically had wood piles and they basically would pay people to take the waste and do something with it so it wouldn't combust itself.

But you're right. There's so many projects that were built that ultimately that when it went from something you were paid to take to where you had to pay for it. And not a clear link. And as you mentioned there is a limited radius that you can transport. And in some of the projects also in terms of changing realities. The

one where the spotted owls just came up. A number of the biomass plants were just shut down period because where they thought they were going to get the wood there was no longer going to be any timber harvesting in that sense. So it's a very – the biomass is very localized in terms of where you can get the source. It's always been an issue has been the guarantee of the fuel supply and the price because at best you'll have a contract that will pay so much. So if it runs out of match there, you'll run into problems.

I guess the other thing that can happen is some of these older projects too – was it some part that the waste wood, people found a way to make products out of it and so, again, it went from something that they would just pay you to get it off our hands, please take this to something that had impending and alternatively more valuable uses than making fuel.

COMMISSIONER PETERMAN: Yes. I've heard the same thing and have also heard anecdotally that some of that waste wood is being exporting to other countries for production, particularly China. And so you're seeing – we've been wrestling with that. What the right scale is for biomass facilities? And they really are site specific and so it's hard to deploy a common model.

MR. SUDOL: Bartek Sudol from California

Volunteers. I promise I'm not a spokesperson for the industry but it seems like fuel cells don't run into this problem because the inputs are there. Unless you're taking down a whole utility or a whole plant you always have the inputs coming in. So that was actually a very interesting facet of the technology.

Also, when I was looking at the Sonoma Mountain Village Development in Rohnert Park, California it seems that for areas of developments in urban areas to allow for PV installations on rooftops requires a lot of forethought by developers and also the planning of where to put that installation. Because they have to find a place that's relatively cheap to purchase but where folks want to live but also that allows enough exposure to sunlight to produce enough energy so those sites seem to be few and far between but it seems that developers have cracked the code, so to speak, and are able to locate – whether that's an old industrial facility somewhere in the city that people do want to move into. So I think that there really are possibilities for land that is perhaps underused right now or just sits and doesn't do anything for land for people to build houses or some other facilities and build those PV installations on them, provided they prepare the building for the added weight.

COMMISSIONER PETERMAN: Yeah. Thank you for

those observations. I think you've correctly pointed out that fuel cells have some beneficial attributes particularly the baseload opportunity. I think the challenge we've seen so far is the availability of renewable fuel and getting that at scale and also the Energy Commission has funded historically smaller scale – smaller fuel cells, which are primarily used for backup power. And we had a conversation in our first panel about whether those technologies will be available to run for longer periods of time and whether there is a residential market to tap into. But I think with fuel cells we've seen that there are different applications and actually in the transportation space we've seen an increase in the use with forklifts, for example. So there are some niche markets where they're developing.

I'll ask the panel to stay here for one second and see if we have any other Public Comments or comment on the phone and then offer you the opportunity, which we never do, to ask us a question if you'd like, if we don't have any other public comment. Otherwise, any final recommendations you have for us.

Just to make sure that you're aware of this process. This is one of seven Workshops we're developing as part of the Renewable Strategic Plan for the state. We identified a number of issues and challenges with

developing renewables in a report last year in the IEPR and in this IEPR we're moving forward with some actionable recommendations. So anything you have to suggest to us, we appreciate.

Any Public Comment in the room? On the phones? All right then any recommendations from our panelists or questions? I can't promise we'll answer them but we may consider it.

MS. FABRIZIO: One question I had I mentioned that the U.S. Federal Tax Credit for wind power is set to expire at the end of 2012. I'm wondering if the Energy Commission, in conjunction with the Governor's Office, is in discussions with the federal government in trying to extend that?

COMMISSIONER PETERMAN: So I'll first say the PTC has expired in past times and we do know that there has been an effect on the wind industry because of that. We are supportive of extension of the PTC. I think anyone who is involved in renewable development is and so I can't say that I'm explicitly in coordination however I would imagine that our representatives in D.C. are working on this issue. But we've just acknowledged previously that we're seeing a slowdown in the wind industry as that deadline approaches. And we heard from these panelists that they don't expect to see a vote on this until after

the election.

CHAIRMAN WEISENMILLER: No. I was going to say that the Production Tax Credit is very important to the wind industry, and certainly that sort of expansion has been a general recommendation. The reality is that most of state government is very Sacramento-focused and certainly has people in D.C. who are trying to work these issues. It is something that both capitals are very self-focused and people's practice areas tend to be one or the other. So in terms of trying to communicate on that it's, you know, you could spend full time trying to find exactly where are the federal measures at any given time. And I'm afraid we're more of the bigger picture here. But again, I think the Chadbourne gentlemen said he thought the odds were better than 50 percent but it certainly would be after the electrician and would be affected by the outcome of the election on whether or not they can get people back and get something cooperative together.

COMMISSIONER PETERMAN: And I will say AWEA, which is the American Wind Energy Association which is the representative trade group for the wind facilities, is making this push at the federal level. I think you're seeing the industry for the first time talk about a willingness to consider a declining Production Tax Credit, which it historically has not. I think it's an awareness

that a federal incentives may have reached a height with ARRA funding and that as we go forward in financially constrained times that some of these incentives will decline. And that's really what this Workshop has been about. To figure out as we move forward, as we see some declining federal incentives what are additional things that the state can do acknowledging that we're also cash strapped, to facility the financing of these projects. And particularly what we've heard and what we've seen throughout the AB 118 program is the value that public funding can play in leverage private funding. And having the government as an early investor.

Other questions? Or recommendations?

MR. SUDOL: This is Bartek Sudol from California Volunteers again. I wanted to ask you your opinion on the applicability of PACE financing and the role it can play in developing new installations. President Clinton recently — former President Clinton recently was extolling PACE as a pretty good tool for getting folks, you know, for putting installations on their houses and other facilities. So I wanted to see if you see PACE as a very important part of this strategy as a toolkit in your toolkit of getting more installations like this out there.

CHAIRMAN WEISENMILLER: One of our biggest energy challenges is how to retrofit our existing housing

stock with energy efficiency. Most houses in California were built before ‘77. The Energy Commission does standards for new buildings but, again, if you look at our housing stock most of it was built before the Energy Commission was in existence. And, frankly, some of the first rounds of standards you could do better now if you were to retrofit.

And that’s a complicated decision for people to do. It requires a fair amount of money and for many of our citizens their houses are under or their mortgages are underwater. So basically the beauty of PACE and when it was viable we were getting a very good response rate from people to do retrofit. And that — when that — because basically what you’re doing is connecting the loan to the drawling property value and there’s a lot of things people pay for routinely in their property tax. So certainly getting more efficient building. So it’s a very good public response once that was blocked. That’s had an impact. We’ve tried to figure out other ways, maybe using utility bills or something like that, again, to provide that convenient financing form. Certainly the Governor has been very active. First, as Attorney General and now as Governor on this issue. Part of the reality is that to the extent that so many of our houses have mortgages underwater means is that banks are particularly sensitive

if you're trying to put someone else higher in the loading order on the payout. And so it's — it certainly is a complicated issue but, again, if we were to talk about one of the most important policy issues we have a state it's how to retrofit the existing buildings.

COMMISSIONER PETERMAN: Echo the Chair's comments. We were discussing this in an ealier panel. That this is a hard market, the residential market, to finance because these are not projects that are going to be financed through project finance. So there's not many opportunities available. There's your own cash equity or there's something like a PACE program or there's the leasing model, which would require then no obligation on the homeowner or the property. And I think with the concerns around PACE right now, as the Chair has mentioned, around who has the first rights and liens and such and debt order. We're seeing more interest, I think, in the lease model and we want to encourage that but also on-bill financing, which would do a similar thing PACE but be tied to your utility payments, as a viable model that the states pursuing.

So thank you. I think we are at our limit. We may even end five minutes earlier. Thank you to our panelists and thank you for your case studies. Hopefully you'll enter them into the record.

MR. SUDOL: Thank you for having us.

COMMISSIONER PETERMAN: Great. Thank you.

CHAIRMAN WEISENMILLER: Thank you. So with that, thank everyone who has participated in our panels today. This is the sixth of our seven renewable strategic plan workshops and we got a lot of information. A lot of things to think about. Look forward to the comments being filed and for your continued engagement.

Our next Workshop is on January 11. It is on — oh, gosh. June 11. Are we in June yet? Our next Workshop is June 11. It's on Integration and I think that it will integrate many of the topics that we've been talking about in this whirlwind tour of renewables over the last month.

Chair, any comments?

CHAIRMAN WEISENMILLER: Yeah. Certainly I'd like to thank for their participation together, particularly the last panel. And, again, we're looking forward to another Workshop but we are getting close to the end point.

COMMISSIONER PETERMAN: And we'd be remiss also not to say thank you to the agency mentors of our last panelists. Obviously, they were well prepared. I don't think that they expected to come up here and speak but I appreciated learning from them and I think we could have

continued our dialogue into the night.

So thanks again. And thank you to Suzanne Korosec who continues her leadership on the IEPR and Heather Raitt as well.

With that, we're adjourned. Thank you.

[Meeting is adjourned at 4:58 p.m.]