BEFORE THE
CALIFORNIA ENERGY COMMISSION

In the matter of,	)	
	)	Docket No. 12-IEP-1D
Preparation of the	)	
2012 Integrated Energy Policy	)	
Report Update (2012 IEPR Update)	)	

Lead Commissioner Workshop
on
Jobs and Renewable Energy in California

CALIFORNIA ENERGY COMMISSION
HEARING ROOM A
1516 NINTH STREET
SACRAMENTO, CALIFORNIA

WEDNESDAY, MAY 30, 2012
10:00 A.M.

Reported by:
Peter Petty

APPEARANCES

COMMISSIONERS:

Robert Weisenmiller, Chair
Carla Peterman, Lead Commissioner, 2012 IEPR
Andrew McAllister, Commissioner

STAFF:

Suzanne Korosec, IEPR Lead
Lynette Green
Pierre duVair, PhD
Chris Graillat
Larry Rillera

ALSO PRESENT: (*Via WebEx)

Presenters

Patrick McGuire, California Governor's Office of Business and Economic Development

Panelists

Carol Zabin, PhD, UC Berkeley
Rhonda Mills, Center for Energy Efficiency and Renewable Technologies
Marshall Goldberg, MRG & Associates
*Richard Morgenstern, Resources for the Future
Lynn Billman, NREL
William Dean, Office of the Secretary, Cal/EPA
John Jaramillo, College of the Desert
Javier Romero, California Workforce Investment Board
John Brauer, California Labor Federation
Nicole Capretz, Environmental Health Coalition/California Environmental Justice Alliance
Susan Wheeler, Sacramento Metropolitan Utility District
Lisa Paulo, California Public Utilities Commission
Evgeniya Lindstrom, San Bernardino Community College District
Raya Zion, Solar City
Mark Tholke, enXco
Ben Foster, Optony, Inc
Glenn Reynolds, Gossamer Innovations
Lew Milford, Clean Energy Group
Melinda Brown, Kern Economic Development Corp.
Dorothy Korber, Senate Office of Oversight and Outcomes
Kim Carr, Sierra Nevada Conservancy
*Bill Gallegos, Communities for a Better Environment

APPEARANCES (Continued)

PUBLIC COMMENT

Michele Piller, Plumas Rural Services
Pauline Ma , CleanTECH San Diego
Richard McCann, Aspen Environmental Group
Babette "Barbie" Beaudette

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P R O C E E D I N G S

MAY 30, 2012 10:06 A.M.

MS. KOROSEC: I am Suzanne Korosec and I manage the Energy Commission's Integrated Energy Policy Report Unit. And welcome to today's Workshop on Jobs and Renewable Energy in California.

Before we begin, just a few quick housekeeping items. Restrooms are out in the atrium, through the double doors and to your left. We have a snack room on the second floor at the top of the atrium stairs, under the white awning, if you want coffee or something to eat. And if you want something more substantial for lunch, there's a list of restaurants within walking distance of the building on the table out in the foyer.

If there is an emergency and we need to evacuate the building, please follow staff out of the building to the park that's diagonal to the building, Roosevelt Park, 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 will make an audio recording available on our website in about a week, and we'll have a written transcript available within about two weeks.

We plan to break for lunch around 12:30 today and

we'll have an opportunity for public comment before we break for those of you who may be unable to stay for the public comment period at the end of the day. During both of the public comment periods, we'll take comments first from those of you here in the room, followed by those participating on WebEx, and then those who are phone-in only.

When making comments or asking questions, please come up to the podium at the center of the room and use the microphone so that we can make sure the people on WebEx can hear you, and so that we capture all of your comments in the transcript. It's also helpful if you can give our Court Reporter a business card when you come up to speak, or when you're done speaking, so that we make sure that your name and affiliation are correct in the transcript.

For WebEx participants, you can use either the chat or raised hand features to let our coordinator know that you'd like to make a comment or ask a question, and we'll either relay your question or open your line at the appropriate time.

We're also accepting written comments topics until close of business on June 6th, and the notice for today's workshop, which is available on the table in the foyer, and it's also on our website, it explains the

process for submitting comments to the IEPR docket. And with that, I'll turn it to the dais for opening remarks.

COMMISSIONER PETERMAN: Good morning, everyone. Commissioner Peterman, Lead of the 2012 IEPR. It's a pleasure to be here with you today and thank you all for joining us. This is, I believe, the fifth of seven workshops we're having as a part of the development of the Renewable Strategic Plan and, indeed, this is a very important one.

Renewable energy has and has the potential to further bring economic opportunities and employment to the State of California. We want to make sure, though, as we develop renewable energy that we have the right business infrastructure, as well as job training in place in order to provide the employees and the workforce we're going to need for this new clean energy sector.

Today is a good opportunity to reflect upon the programs we have to date, what's happened with the graduates, where are the opportunities, and where are the gaps, and where can policy step in to start drawing some better connections and make sure that we're taking advantage of the opportunity we have here before us.

We have a tremendous amount of talent and expertise today, in today's workshop, and I hope that, in the small breaks that you get, that you take the

opportunity to converse with each other. I want to see companies talking to trainers and talking to policy makers. This is part of the discussion, it is not the whole discussion, and we look forward to your comments and further dialogue. And so, with that, let me turn to Chair Weisenmiller for any additional opening comments.

CHAIRMAN WEISENMILLER: Thank you, Commissioner Peterman. Again, I'd like to welcome everyone today. Obviously, the jobs are an important part of our energy policy in terms of the consideration, you know, as we try to focus on climate change issues, it's really important we look at jobs and provide opportunities for all of our citizens to participate in the energy industry. So with that, again, looking forward to a very instructive day.

COMMISSIONER PETERMAN: I will also mention we're joined on the dais by Commissioner McAllister, and I'll turn to him to see if he has any opening comments.

COMMISSIONER MCALLISTER: No, just I'm very interested in renewable energy, quite involved in the distributed sector, obviously it's much broader than that, there's an increasingly larger scale and also interested in consideration of some of the equity issues in the sort of lower income neighborhoods and participation in deployment of renewable energy there, and sort of its real practical impact on jobs and the

potential there, which I think deserves some discussion to sort of flesh that out.

But thanks to Commissioner Peterman, in particular, for her leadership on this, and I'm looking forward to an instructive day. Thanks.

MS. KOROSEC: Great. All right, as Commissioner Peterman mentioned, this is the fifth of seven workshops that we've held since April 12th. Our upcoming workshops will be June 6th, which will be on financing and R&D issues, and then, on July 11th, we'll be talking about integration issues.

So just a little bit of background. Every two years, in odd numbered years, the Energy Commission prepares an IEPR with assessments of energy trends and issues facing California. Based on these assessments, the IEPR provides recommendations for ongoing State Energy Policy to the Governor. In alternate years, we prepare an IEPR update and this is an IEPR Update year.

Back on 2010, Governor Brown, in his Clean Energy Jobs Plan directed the Energy Commission to develop a plan to expedite permitting of the highest priority renewable generation and transmission projects. To lay the foundation for that plan, the 2011 IEPR Proceeding focused on identifying challenges to renewable development and discussing efforts underway to address

those challenges.

The Renewable Power in California: Status and Issues Report was issued in late 2011 and included five high level strategies to be used as the basis for the Renewable Strategic Plan to be developed during the 2012 IEPR Update Proceeding.

So today, we're discussing Strategy 4, which focuses on developing renewable technologies and projects that will promote job creation and economic development in California. The Governor's Clean Energies Job Plan emphasized the importance of investing in renewable energy as a central element of rebuilding California's economy, and noted that renewable development has the potential to create thousands of jobs and build 21st Century businesses.

We've already touched on today's topics in earlier workshops, including at our first workshop on April 12th, where we talked about jobs in economic development in the context of non-energy benefits of renewable projects, and at the May 10th workshop on identifying priority areas for renewable development where we talked about the need to focus on areas of the state that have the greatest potential for the job and economic benefits.

Our agenda today begins with a special guest

presentation by Patrick McGuire, from the Governor's Office of Business and Economic Development; next, our first panel will talk about the number and types of jobs that are being created based on existing policies and programs, and expectations for future job creation by 2020, also possible strategies to generate more jobs throughout the renewable energy supply chain. We'll have an opportunity for public comment after the panel, and then we'll break for a one-hour lunch and return with our second panel on Job Training and Economic Development Programs, which will talk about lessons learned from existing programs, about the skills needed for workers in the renewable industry, and potential gaps in those skills, the potential disconnect between the number of workers being trained and those actually able to get jobs, and strategies to improve job training, to match job training to demand and local economic development, and to ensure that California has a qualified workforce to support renewable energy development.

Our final panel will focus on how businesses have created jobs in California and the challenges that they've faced, along with lessons learned from economic development strategies employed by other states. We'll finish up with another opportunity for public comment, and we hope to adjourn by 5:00.

So before we begin the agenda, I'll just go over some of the information presented in the Renewable Status and Issues Report related to job creation issues, to provide a little background for today's discussions.

The Renewable Report emphasized the economic development benefits from clean technologies, including renewable energy development.

In the first quarter of 2011, U.S. venture capital investments in Clean Tech increased by 54 percent compared to the same period in 2010, totaling more than a billion dollars, and more than half of that investment was in California. Investments in the clean energy economy are also in promoting job creation. According to a 2011 Report by Next 10, from 1995 to 2009, the energy generation sector created the most jobs in California's green economy and added nearly 20,000 jobs. The Next 10 report also found that, while total state employment has grown by 18 percent since 1995, employment in the Green economy grew by 56 percent during the same period and this growth continued even during the recession.

Between January of 2008 and 2009, green employment increased by three percent, while total employment growth was less than one percent. And employment growth has been particularly noticeable in energy generation and energy storage.

The Next 10 report also showed that manufacturing has strong employment shares, which represent 26 percent of all green employment, but only 11 percent of California's total employment. The Next 10 findings were supported by a Brookings Institution Assessment of National and Regional Green Jobs that was published in July of 2011, which concluded that, nationwide, the Clean Energy economy employs more workers than the fossil fuel industry, with four of the five fastest growing clean tech areas between 2003 and 2010 being in renewable energy; that sector added about 50,000 jobs in solar thermal, solar PV, wind power, biofuel, and fuel cell production.

The Brookings report also showed that California led the nation in Green jobs at nearly 320,000, well over 100,000 more than the next largest state, which was New York and, in fact, our local area here, the Sacramento Arden Arcade Roseville Metropolitan Area, was third among the 100 largest metropolitan areas in the country, with the highest share of clean economy jobs.

Like the Next 10 report, the Brookings study showed that the clean economy is manufacturing intensive, with roughly 26 percent of all clean economy jobs in manufacturing, compared to nine percent in the broader

economy. And the report also noted that the clean economy offers more opportunities and better pay for low and middle income workers than the national economy as a whole.

Other 2010 studies discussed in the Renewable Report included surveys conducted by the Center for Energy Efficiency and Renewable Technologies, a National Solar Jobs Census by the Solar Foundation, and a Solar Tech Labor market analysis surveyed 14 Clean Energy Developers in Southern California to better understand the workforce needs, and that survey provided a sample of the kinds of jobs that are being created by large-scale renewable energy facilities, jobs like welders, pipe fitters, millwrights, laborers, electricians, ironworkers, and engineers. And the survey also indicated that thousands of workers would be needed between 2010 and 2015 to build the power plants that were proposed in Southern California, along with hundreds of workers for more permanent operation and maintenance jobs over the next 20 to 30 years. For distributed generation projects, CEERT estimated that construction jobs to build 2000 PV projects totaling 6,000 megawatts over a 10 year period would create a monthly average of around 10,000 jobs in trades similar to the ones I mentioned for utility-scale renewables.

The Solar Foundation Job Census found that, nationally, solar companies expect to add jobs at a much faster pace than the general economy. And this trend is important for us since, in 2010, more than 30 percent of the estimated solar jobs in the United States were in California.

And finally, a labor market analysis by Solar Tech found that, in 2010, California was home to more than 1,000 solar firms with approximately 36,000 employees and, because many of the existing workforce programs are already servicing the Solar PV Installer occupation, the Solar Tech analysis suggested that we should focus on training in PV Sales and System Design, estimating there would be 650 to 1,300 new PV sales jobs in California in 2011.

The Renewable Report discussions of jobs focused primarily on workforce development, with an emphasis on California's need to have a well trained workforce to support development in the state. Challenges that were identified in the report included the recession, which caused difficulties in creating a steady bridge between workforce training programs and actual employment; in a fragile economy, employers are hesitant to take on more employees, which have meant low placement rates for some workforce training programs.

Another challenge is mismatch between job training and actual jobs available in some communities. Rooftop solar and other renewable energy investments aren't always accessible to low income communities, which can leave those communities with lots of trained workers, but no actual jobs. Also, with the delay and elimination of programs like Home Star and PACE, and with costs for rooftop solar and small-scale renewable still prohibitive for many communities, trainees are finding jobs hard to come by.

Finally, the Brookings report I talked about earlier suggested that, while a lot of the growth in the clean energy economy is creating demand for workers in existing occupations, it's also driving the need for workers with enhanced work skills and training. This really emphasizes the need for a coordinated approach to workforce training that is more closely aligned with industry needs and labor demand.

California is already at the forefront of workforce training. The Clean Energy Workforce Training Program, which was developed by the Energy Commission, the Employment Development Department, and the California Workforce Investment Board, using Federal Stimulus funding is the largest State sponsored Green jobs training program in the United States. In addition to

providing training, the CEWTP, as it is called, also provides grants to establish community college and other training program curricula, which will support long lasting and sustainable clean energy workforce development in California.

As part of CEWTP, an Interagency Agreement with the Employment Development Department provided $24 million in grant funding for workforce training and, at the end of that program, the training organizations that received grants are expected to have trained nearly 5,000 workers in areas like energy fundamentals, general construction, solar electric installation and design principals, certified PV installation, and wind turbine technology.

CEWTP also has an interagency agreement with the Employment Training Panel, which provided funds to Grantees to train nearly 3,000 incumbent workers in clean energy skills, while meeting a 90-day employment retention period after training is completed. Two really good examples of training efforts by community colleges funded under the CEWTP Program are Kern Community College District and the College of the Desert and Palm Desert. Kern has developed curricula for its Power Tech, Solar Tech, and Wind Tech Programs, which are targeted to entry level positions with utility companies and contractors,

utility-scale solar thermal and PV companies, residential and commercial solar installers, and utility-scale wind and turbine companies. The district also has a pre-apprenticeship program to introduce women to the Green jobs industry.

The College of the Desert has been working closely with solar developers like First Solar, Solar Millennium, Solar Reserve, and NextEra. First Solar donated and installed two 45-foot arrays of thin film modules and rack mounting equipment to train workers, and Gossamer Space Frames, a design firm based in Huntington Beach, donated eight parabolic trough frames, mirrors, and a tracking drive unit for training.

A training program that compliments CEWTP is the Green Innovation Challenge Grant Program, which is administered by the Labor and Workforce Development Agency and EDD to provide training for up to 3,000 workers. It's providing training to community college students in the Bay Area to perform after-market repairs and maintenance on electric and alternative fuel vehicles, it's helping the San Diego region to develop college curricula and certifications for workers in the biofuel industry, and training PV solar installers, designers, and marketing professionals.

Another important effort to build a future

clean energy workforce is career technical education at the high school level. The Energy Commission's Public Interest Energy Research Program helped fund the California Partnership Academy's Green Clean Initiative, which funded around 60 programs through the Department of Education that focused on Green careers like Green Buildings, Sustainable Design, and Green Engineering.

To expand the number of students who want to pursue careers in renewable energy and other green industry sectors, legislation passed in 2011 is providing $8 million in annual funding for a grant program to fund Clean Energy Partnership Academies for grades 9 through 12. These academies serve primarily at-risk students and focus on preparing students for a variety of Green jobs. The guidelines for the program were released by the Energy Commission and the Department of Education in December of 2011.

Other PIER funded workforce development activities include cost share funding provided to California State University, Sacramento to develop a clean energy workforce curriculum targeted towards training for jobs working in the Smart Grid applications. And PIER also sponsored research and held a workshop in 2011 on the potential for a regional hub of a National Center for the Clean Energy Workforce to be located in

California, which would serve as a clearinghouse for information on best practices and technical assistance.

Other efforts that are related to workforce development include the sales and use tax exemptions on manufacturing equipment purchased for clean energy and manufacturing facilities and renewable energy generators. That's overseen by the California Alternative Energy and Advanced Transportation Financing Authority. These exemptions were authorized under Senate Bill 71 with more than 6,000 jobs estimated to be associated with the exemptions, and as of July 2011, 30 copies have received exemptions, including PV manufacturers, as well as power plant operators who are repowering from fossil fuels to renewable fuel, including a coal co-gen plant at the Port of Stockton that's converting to biomass.

Finally, the Energy Commission's Clean Energy Business Finance Program is working to create jobs through low interest revolving loans for clean energy manufacturing businesses. At the time the Renewable Report was published, it was estimated that companies receiving these loans would create more than 600 jobs throughout California.

So that's a very quick summary of the information that's contained in the Renewable Status and Issues Report, I do encourage parties to look at the full

report for additional details.

So now moving on to our first presenter, I'd like to introduce Patrick McGuire from the Governor's Office of Business and Economic Development.

MR. MCGUIRE: Good morning.

COMMISSIONER PETERMAN: Welcome. Thank you for being here with us today.

MR. MCGUIRE: My please. I'd like to thank the Commissioners for inviting me to be here. The Governor's Office of Business and Economic Development is a new entity in the state. We had been GoED under Governor Schwarzenegger, it was an effort to assimilate different entities that were working on economic development programs throughout the state and bring them all together.

Speaker Perez had introduced AB 29 and it was signed by Governor Brown. We're working in different areas, economic development, small business, international trade, and I'll be going into some of those a little bit more finitely. But as of July 1st of this year, we will be entering into our being, we're in existence right now, and we officially will be in Code and active.

Permit Assistance is one of the offices we're working in, we have three staff working in this, one in

the Central Valley, one in the Sacramento and North Region, and one in Los Angeles and South. Lillian Conroe, for example, is our person in Los Angeles and, to share one of the successes she has had, a restaurant chain was looking to install a new product into their 600 stores in the Los Angeles City and County Region, they were able to work with Lillian, to talk to the Planning Departments, they were able to look at the floor plans of all the restaurants, since it was a chain it was all going to be the same; by adding the new product line in place, was going to increase employment at each store by about 2.5 people, and so what they were able to do was approve the plan for one site and then share that with all the others. So, 600 Building Permits were approved in a 30-day time period, where normally this would have taken years. So that was one good success that we have our hat on.

The Office of Small Business is in our organization, the Small Business Advocate is housed there, and we also have a liaison to the Small Business Development Centers that are throughout the state and we try to work closely with them. Sometimes in my position and my co-workers, we receive calls from start-up businesses that are interested in ideas, they have a great idea, but they just don't have it completely mapped

out and we're able to hook them up or introduce them to the Small Business Development Center in their area, and they are able to work through them, get their business plan better defined, think of things they weren't thinking of -- they have a great idea, but they may not have all the steps in place, and we're able to work with them after they come out of that program and find out some success.

International trade, there's been some discussion of the potential China offices that are under review, there's also been some work with trade missions to China, we also have trade missions that have gone into Germany, the liaison person from the community colleges that is working in that area, and we've seen some successes.

Probably about 20 percent of the clients we've been working with over the last two to three years are international firms that are coming here and some of those are green companies.

The unit I am in, California Business Investment Services, I'll be talking a little bit about some of the things we do later, and the iHubs are part of our innovation and entrepreneurs; iHubs started out as a business, transportation and housing industry a few years ago, it's a five-year pilot program that's looking to

link up people in economic development in special areas of interest that may not have the opportunity to work together and speak, and it's so far been very successful in the reaches where it's at.

Looking at a few of the things that are going on in the California economy, the thing that we're focused on and trying to remedy is the two million people that are currently unemployed in the state. Innovation, we feel, is a key way to have it happen.

Last Sunday, the *Sacramento Bee* had an article on innovation and how a lot of the jobs and innovation, the concepts are happening here, but the manufacturing is happening elsewhere. I think that's one of the things we can look at policies and procedures and see what can be done to try to rectify that.

In the last few years, I've worked with several clients, international, coming here looking to open up solar panel manufacturing plants, wind turbines is another one that has come into question, we've had bio digester manufacturers coming in and, probably as we look at policies, I think a lot of times it has to happen at the local level.

One example I'd like to give is in San Diego, there was a solar panel manufacturer that was looking to come in, set up a manufacturing facility, but the other

thing they were looking for was to sell their panels to San Diego Gas & Electric, and California was just one of several states they were looking at to put their plant, and the thing that SDG&E did was they set up a Power Purchase Agreement with the company that they would buy the panels only if they were manufactured in their service area. So with that clause in there, it dictated that the plant went in there and, in December, we had a ribbon cutting at their plant, Soitec is the name of the company, and they are in Rancho Bernardo in San Diego.

As we look to innovation, I think it's key to look at -- we have several electric car manufacturing companies that are starting to start here, as we look historically, we had several major car manufacturers with plants in the state, but many of those have gone by the wayside. But we still have the innovation and design centers for all major auto manufacturers in California, they're in Los Angeles or San Diego, so I think that's a key thing to look at.

As we look at high tech employment, we define high tech as, of course, computer, biomedical is a major employer for the state, renewable energy, and in that we're looking at solar, wind, geothermal, biofuels, and lately we've been getting a lot more interest in anaerobic digesters. One of the things we've seen is

there's a 1,700 dairies in the state, over 80 percent of them have more than 500 head of cattle, and we're starting to see a lot more interest from bio digester companies that are looking to come in, take the manure, make methane, and then either sell the methane or then turn it into electricity.

Governor Brown signed SB 617, this was, I think, a key piece of legislation, it's looking to see what could be done at the policy level to streamline our permit process.

I think the first thing we have to do before we solve the problem is identify what it is. By just mentioning bio digesters, one of the key things that are happening there is one of my co-workers has been involved with a study of how to streamline the process. Representatives from the Department of Agriculture, Cal/EPA, the Water Boards, and the Air Districts throughout the state have been meeting on a way to streamline that permit process, they're now down to an agreement that it will be one permit and one lead agency, and then the process of launching the permit process for the first one, which should be coming up in the next few months now.

My unit, California Business Investment Services, we work in a number of different areas, I've

worked with companies looking to either expand in California, or come to California to establish locations, work with everything from dog food manufacturers to solar panel manufacturers, to major equipment manufacturers like the Caterpillar plant, the warehouse distribution center that's getting ready to go into Kern County, and also goldmines.

We try to be a one-stop-shop, we try to have linkages, there's only five of us in our unit, we know we can't do it all, but one of the things we've been able to do is establish better relationships with the Economic Development Corporations throughout the state, and then work with the client to site their location or work their expansion at the best process we can.

As we look at our existing economic development programs in the State Enterprise Zones in LAMBRAs, LAMBRAs were set up in closed military bases, there were eight of them originally, they had many of the incentives like Enterprise Zones, hiring, tax credits, sales and use tax credit, incentives to allow businesses greater ease of selling to the Department of General Services, many of the LAMBRAs are still in existence; some, however, have been absorbed into Enterprise Zones as the Enterprise Zone Programs have expanded and grown over the last few years. There are currently 40 zones that are managed out

of our Department of Housing and Community Development, and they're in the process now of seeing what they can do to streamline and make the program more efficient.

CAEATFA was originally set up as a program to help with electric car manufacturing, this was one of the ways where the State was a bit innovative; we took that program and made it available to producers of electric energy, renewable energy. The companies can apply for a tax credit so they don't have to pay the Sand Use Tax Credit, essentially they apply to the State and, if approved, then the State buys the equipment with them and that is waived.

The Employment Training Panel was probably one of the most successful programs we have. ETP provides training dollars to the company, the company sets up a contract with ETP, they go through the training process, the training was done, the training is done to keep workers trained and informed of new equipment coming on line, and then they receive a cash reimbursement.

Industrial Development Bonds are a key funding mechanism the State has, probably one of the stumbling blocks to it has been the need for a Letter of Credit, and we're working to see what we can do with the iBank to remedy that.

The R&D Tax Credit is a major incentive that

the state has, 15 percent for direct work that the company is doing, 24 percent if they farm it out to another agency or department, and it's double what some of our other competitor states have and that's been very lucrative for us.

AB 118, I think you're all familiar with that, so there's no point in going any further on that. And then the CPIP Program is one that was developed years ago, it was called the Intel Bill, it was done to provide an incentive to assist Intel with putting a wafer manufacturing plant in California. They weren't able to make that work, it's a program that's never been activated or used, but we're now looking to reformat it and see what can be done to make it effective and efficient in the state.

I thank the Commissioners for allowing me to come in and talk this morning a little bit about some of the job creation and work development programs we're working with throughout the state, and I'll answer any questions you have.

COMMISSIONER PETERMAN: Thank you, Patrick. That was very informative. It was nice to hear about all these programs at one time and there's quite an array. First, just a basic question. You mentioned that your unit is serving as a one-stop-shop, if you will, so is

there a common web portal or something where someone can find all this information, as well as understand which ones are more appropriate for them to participate in or not?

MR. MCGUIRE: It depends on the company, and it depends on the opportunity. Our Web portal is wwww.business.ca.gov. In there, we talk -- we have several of our publications listed, and one is the California Investment Guide which I have a printed copy of here, but we also have online -- it lists all the incentives in the State, several of which I didn't go into here, some of the programs CalRecycle has like RMDZ, the Bottle and Can Recycling Fund that are available.

EB5 is a Federal Program that is mentioned in there; WOTC, the Workforce Opportunity Tax Credit, is another Federal program that's mentioned in there. And then we also have our Incentive Guide for International Investors that goes through a step-by-step guide of everything that has to be done to establish a location in California. So there's a lot of information on our website.

COMMISSIONER PETERMAN: Thank you. And regarding clean energy businesses, you've mentioned a couple of the barriers that business has raised for operating in California, permitting, for example, has

come up. Are there any other ones, in particular, that you've heard from the clean energy sector?

MR. MCGUIRE: Well, I mentioned with the anaerobic digesters they're working together to streamline that permitting process, and I think that's a good step in the right direction of getting like minds together to make sure that the integrity of the law is met, but the speed of which a company can bring their product from concept on to line, and get it operational, is also important. So I think that's a good example of how they're working together.

COMMISSIONER PETERMAN: Thank you very much.

MR. MCGUIRE: Thank you.

MS. GREEN: All right, at this point, I'd like to call our first panel, our invited guests for Panel 1 on Quantifying Jobs from Renewable Energy, if you could come up and go to your designated seats? Our moderator will be Pierre duVair, Energy Commission staff.

MR. DUVAIR: Good morning, Commissioner Peterman, Commissioner McAllister, and Chair Weisenmiller, my name is Pierre duVair, I'm an Environmental or Climate Economist in the Special Projects Office of the Fuels and Transportation Division here at the California Energy Commission. And I have the fortune to lead this morning's panel focusing more on job

quantification issues in California.

We have a great set of panelists and we have one that's going to be hopefully calling in via WebEx; we have yet to get Dr. Morgenstern on yet, but hopefully he'll be able to join us via WebEx and share some of his innovative research that he's doing on job quantification issues. He's in the middle of a workshop with the U.S. EPA right now on that topic.

But in the mean time, I'll lead off with just a few remarks about the California Clean Energy Future, it's a project that I helped work on, a jobs metric, and a number of metrics were developed trying to sort of track our progress towards Clean Energy Future here in California.

It was recommended that we track jobs and a handful of staff here at the Energy Commission came up with fairly simplified techniques for estimating the jobs that come out of renewable energy, energy efficiency, demand side programs, and transmission, had some help with PIER Program staff like Adrian Kandel and renewable staff like Gary O'Neill and Heather Raitt worked with us.

You can see the entities involved with the Clean Energy Future, the Governor's Office, the Public Utilities Commission, CAISO, Air Board, and Cal/EPA all participate in developing a lot of these metrics for a

Clean Energy Future.

And if we could jump to the next slide, I will show you some of the estimates that we have for the types of job numbers that could come out of investments in Clean Energy Future in California.

On the demand side, we estimate -- we relied upon a number of studies that estimate job year creation based on total dollar investment. We needed to fall back on readily available information, and the utilities have annual budgets of capital investments in energy efficiency, so we decided to focus on that source of funding and the types of jobs that can be created out of those capital budgets. There is a lot more complex ways to do it, and several of our panelists can tell you about that, but we chose not to go the modeling route, except we did rely on the JEDI model, and Marshall Goldberg will speak a little bit more about that for the renewables jobs quantification. And we certainly talked with Dr. Zabin about the ways to estimate the energy efficiency jobs.

But we have fairly aggressive numbers, I think, on the job years that we get out of capital expenditures from as low as $56,000 in investment to get us a job year up to about $40,000. The Council of Economic Advisors for the ARRA Programs had a figure of $93,000 per job

year, so there's a quite a range in the literature. We relied on some local California studies and these estimates do look at only job creation, or gross jobs, not that they don't deduct the jobs that we may lose for power plants we don't build, or higher priced energy may lead to some job loss.

So these are strictly just job creation numbers and the estimate that we get for the decade between 2011 and 2020 is somewhere from around 480,000 job-years up to 770,000 job-years. So in terms of the whole California economy, these numbers are small, but it's a significant number of jobs for the types of investment that we're talking about here, we're not looking on the energy efficiency side at private sector investments, these are just the budgets for the utilities for energy efficiency.

So with that, I think we should jump right into our esteemed panelists and let me find out if we got Dr. Morgenstern on line yet. We haven't been able to get him, so it looks like U.S. EPA won't share him today.

So maybe we can go ahead and I'll give a little extra time for questions and I know our panelists have plenty to talk about, so why don't we go ahead and start with Dr. Carol Zabin.

COMMISSIONER PETERMAN: And, Pierre, I'll just say, I note we started this panel a little bit early, so

we'll take all the time we can get, but if Dr. Morgenstern comes on line, then please break to hear his presentation.

MR. DUVAIR: Okay, very good.

DR. ZABIN: Okay, good morning. Can everybody hear me? How's that? Thank you, Pierre and thank you to the Commissioners and public here to give me an opportunity to make some comments on jobs, and I'll be talking both about renewables and energy efficiency; my expertise is more in the latter.

I am Co-Chair of the Don Vial Center on Employment in the Green Economy at U.C. Berkeley and I believe Pierre invited me because of my work in a comprehensive CPUC and IOU Ratepayer funded study, the California Workforce Needs Assessment for Energy Efficiency, Demand Response, and Distributed Generation that was actually mandated in the Long-term Energy Efficiency Strategic Plan, and did very careful forecasts of jobs, as well as analysis of our existing training infrastructure for energy efficiency and renewables and provided a set of recommendations on workforce development for the energy agencies in California.

And because of that, we were sort of immediately dropped into this -- I would call it a vat of confusion -- around measuring jobs and measuring green

jobs, and also what the goals of energy agencies are around jobs.

And I do feel like following the California Jobs Energy Future is where metrics were developed for all the energy goals in the different sectors in the state, and the jobs impacts metrics were dropped into that. It's a little bit the cart before the horse in the sense that I haven't seen clarity in any of the California State agencies involved in energy and complying with AB 32 about what really are our job goals.

It used to be, before the Great Recession that, during the AB 32 debate, the studies -- it was hoped that the studies would show that AB 32 was not a job killer. Since the Great Recession, we've seen green jobs as the great savior and job generator to pull our economy out of the recession, even though in all of the studies green jobs, however you define them, as broadly as you can get, they're only three to four percent of our economy, at best. So, though they show tremendous growth rates, they are still a tiny percent.

The energy sector is a small overall percentage of employment in a 15 million job economy, especially when most of the jobs are construction jobs and we've lost, you know, from the peak 30 to 40 percent of -- hundreds of -- 300,000 to 400,000 construction jobs.

So are we trying to prove that energy policy is a job generator? Are we going to choose which energy programs to support because one is more job intensive than another? Do we care about -- I heard you speak of the equity lens -- do we care about whether these are good middle class jobs, or who are they going to? Are they going to folks who have been excluded in the past? Is the job metric really for planning purposes so that we can prepare our workforce infrastructure for these jobs?

All of those will give you different measures and different things to look for and that doesn't even get to what I think, after our study, is the main role for the energy agencies, including the Energy Commission and the CPUC, which is really to set standards on the work in terms of what experience contractors need to have to do this work, what experience and minimum skill standards workers need, and that missing link, I think, is really the key because it's definitely in the purview of the energy regulators to influence that, and it's important both to send clear signals to the training community, it's important for the equity because it can determine whether these are poverty jobs or good jobs, and it's important for the quality of work and the actual business development -- successful business development based on quality and innovation.

So I'm going to skip this slide, but it's there for your background on how you would measure, and instead go to our story and tell the story of the different measurements in terms of what we found for energy efficiency and the demand side of renewables, not the utility scale renewables.

But we found that altogether, in terms of ratepayer and public investment and policy mandates, would induce about 200,000 jobs by 2020, and this includes both the jobs and the direct contractors, or receivers of subsidies, but also the supply chain and the induced demand.

So this is the economic stimulus impact of these policies. That's very different than what we consider a measure of green jobs because a lot of those jobs are in grocery stores, because if you build a solar farm in wherever, then that worker goes and spends their increased income in grocery stores, and that doesn't by anybody's definition really look like a green job, but it is a job that is produced by this policy that you folks are responsible for.

You can define green jobs in a variety of ways, is it businesses who produce green products and services? In our case, we defined it as -- through an occupational lens -- green jobs are jobs that have some skilled

content, related in this case to energy efficiency and renewables. So that's a different purpose and a different measurement that corresponds to that purpose.

If you're doing a look at the number of jobs for planning purposes in terms of how many job seekers may have a chance to get a job in the green economy or in the renewables field, then you're really only looking at the incremental growth in investment and tracing that investment to jobs in a one-year period because you have, say, a training program that produces X number of graduates, and they need to find jobs in the X number of slots that are opened up that year. And so, we go down from 200,000 to 5,000 if we're looking at a jobs projection of new openings available to job seekers. Next slide, please.

I was able to pull out from our study the jobs numbers from energy efficiency, which are in blue and the demand side, again, only demand side renewables, which are in green on this slide. And we can see the investment is much bigger on the demand side in energy efficiency and, of course, the jobs are much bigger. Next slide, please.

We were also able to look at the amount of investment per job, per year, and here energy efficiency and renewable demand side renewables are fairly similar

varying from $83,000 investment up to about $118,000 for the industrial renewable heat and power, of that programs. So there is a range, but it's a fairly small range, it's a much smaller range than PIER found and it corresponds more to the national estimates.

But we went through, as Pierre said, a very detailed estimation, really following the budgets and then the participant costs, the complementary private investment that goes with any incentive or rebate program, and came up with these job factors.

I think these job factors could be used and then matched to whatever new programs and new levels of investment -- because investment is a lot easier to trace through budgets and then just be used as a job factor to make rough and quick and inexpensive estimates of the gross job impact.

COMMISSIONER MCALLISTER: Can I just ask a clarifying question?

DR. ZABIN: Yeah.

COMMISSIONER MCALLISTER: So those numbers are total project cost, right? That's not just the cost to the -- it's not any one particular bin, it's the total cost, right?

DR. ZABIN: It's the total cost, so that's a --

COMMISSIONER MCALLISTER: Including private

capital --

DR. ZABIN: -- very important distinction between what Pierre did, which only measures the public investment or ratepayer -- public or ratepayer.

COMMISSIONER MCALLISTER: All right, got it.

COMMISSIONER PETERMAN: Well, a follow-up question here, as well. On the slide before that where you look at jobs per demand side program, is that to date? Or is that over the entire expected goal?

DR. ZABIN: This is actually for 2011, our estimates.

COMMISSIONER PETERMAN: Okay. Thanks.

DR. ZABIN: So then, you know, for planning purposes in terms of workforce development, we also need to look at types of jobs, and this is really critical and still not totally, I think, absorbed by policymakers, but two-thirds of these jobs are construction trades jobs -- traditional construction trades jobs, only two percent are what you might call specialized energy auditor or solar panel only, and about a sixth are the professionals associated with the building and construction industry, even for renewable power generation, it's still engineers and construction managers.

Wages -- you always hear green jobs are good wage jobs, that's not at all necessarily true, they

follow the construction market and the construction market is incredibly bifurcated with public sector and big commercial being good jobs, the professional jobs are good jobs, and the whole residential sector are not so good jobs and, in fact, are the targets for our state labor agencies for violations of Worker's Comp and basic labor laws, lack of permitting, etc. etc.

So we really have to be very careful to say these are decent jobs because they follow our market and we know how bifurcated our wage -- our labor market is. And I just have to insert, since these are construction workers, and I wasn't asked to talk about training, but I'm just going to put in one sentence, which is to say, after saying this and being in these forums for three or four years, to not see apprenticeship listed in the list of training programs that have been successful, I mean, we documented by completion rates, by wages, by depth of training, by placement, it really is the college for construction workers, maybe not other sectors, but for construction workers, it is the premier program and it is a state certified system, and state regulated.

The final comment is, going back to my first comment about what is the role of the Energy Commission, as you really clarify what the goals are around jobs and how much you weigh the non-energy jobs benefits of energy

policy, if it's an equity lens, if it's just making sure you don't reduce jobs, or if it's that you actually design policy around which is the best job generator, I think a really important role, again, because these are labor markets with little development of skill standards, except for in the public and commercial sectors, big commercial, high-end sectors, this lack of clarity about the basic minimum skill standards that workers need to have to participate and get the benefit of public or ratepayer investment, that is really the most powerful role Energy Commission and CPUC have in terms of determining the quality of the work, which is essential to meet the energy goals, determining the clear signals that we could send to our training community so that we do things well on the training side.

And finally, to sort of make sure we go on a high road development with the possibility of really generating a professionalized, stable, trained, continually learning workforce, which we need to be on the cutting edge of clean energy in the country, in the world.

COMMISSIONER PETERMAN: Thank you very much for your presentation and for your work in this area. Just one question about standardization and skills and training; I appreciate you bringing that up as something

that the Energy Commission and other agencies can work on. Some have also raised, though, concerns about professionalization standardization in terms of creating barriers to entry, or raising costs, and I was just wondering if you could speak to whether you've been hearing this from the energy efficiency community, or renewables community.

The one I'm most familiar with is like the certification boards for renewable energy -- installations, for example, like solar installations and how it's recommended, but not required, for example, by the state.

DR. ZABIN: Right. Well, there's two separate issues, one is cost and one is barriers to entry. I think there has been this real myth that you can get somebody with fairly low levels of education and skills and train them for two or three months, and get them a good job, and that just is a myth in this economy. They will be stuck in a dead-end low wage job, period.

It might be a little bit better, it might be -- a solar job might be $15.00 an hour instead of a remodeling job that's $10.00 an hour underground with no Worker's Comp, but it's not going to be a decent long-term career path.

However, there are -- certification is a

sufficient -- a necessary, but not sufficient condition of good careers and good career paths and quality work, but there has to be pipelines. The pipelines in the construction industry are either two-year to four-year degree for the professional side, or a pre-apprenticeship -- tied to apprenticeship -- on the trade side. Okay?

In terms of cost, I think we've been in debates at the CPUC about this, and the HVAC sector is the classic one, where, you know, we spend all this ratepayer money subsidizing energy efficient equipment with no standards on the actual quality of work, and we've been losing potential energy savings.

Now, will it cost more to do quality installations? Yes. The question is, and there is a big research agenda out there, does an investment in quality and workforce and contractor standards get you enough energy savings to offset the costs of the higher training and wage and contractors?

And I think from other industries we see that there's always a -- there is always a tipping point where you raise standards too high and you get higher costs, but we are so way way way below that in many of the critical sectors that raising standards at least part way, I think, will yield benefits that outweigh the costs.

COMMISSIONER MCALLISTER: I want to just follow-up on that. So I'm an incoming assigned Commissioner on energy efficiency, so I'm obviously outside of this forum, you know, next year's IEPR, you know, we hopefully will talk about this much more deeply and prior to that, as well. But I very much appreciate your knowledge and understanding of the realities of the marketplace, which often are not cut and dry at all, and you know, I think on the one hand, absolutely, we need clear standards not only on the energy efficiency, but on the solar side, and I would be interested in your sort of assessment independently of those. Those are two pretty different markets, so I think they do require separate discussions.

But you know, on the one hand, we definitely want the marketplace to understand that there are standards and that they will be held accountable, right, and so enforcement is kind of a fundamental issue there. But also, we depend on these contractors to go out there and, across the kitchen table, you know, across the Board Rooms, sell jobs and then implement those jobs, and so they have to have business models that can actually function in a real marketplace.

And so those are somewhat conflicting kind of goals, you know, so I'm wondering sort of how you see

where we are in renewables, you know, the subject of this workshop, and where kind of the -- you know, you talk about apprenticeship, absolutely, you know, helping with managing businesses and kind of scaling up small businesses and things. In the renewable sector, specifically, where do you sort of see the needs and opportunities there?

DR. ZABIN: Well, renewables isn't -- I don't have as deep a level of expertise on renewables, I do think -- a lot of people think -- that sort of the lack of prior success to solar in its first generation in the '70s was really a lack of standards and lack of quality that was necessary to ensure reliability and ensure a return on investment over time.

Now, you know, there are competing certifications; for example, in solar, some are very high-end, some are medium, and I think the unfortunate thing is that we didn't set clear standards from the beginning. And this issue of competing standards is a problem because then interest groups each have a stake, a vested interest in those. Does that answer your question?

COMMISSIONER MCALLISTER: Well, I guess, so would you then recommend that, you know, sort of NABCEP become the standard vs. just being a member of the CSLB,

or having the right particular contractor's license --

DR. ZABIN: I don’t feel prepared technically to answer --

COMMISSIONER MCALLISTER: -- that sort of high, medium, low --

DR. ZABIN: -- that question, however, I do --

COMMISSIONER MCALLISTER: -- okay, no, no problem, no problem --

DR. ZABIN: -- feel that there are some clear processes by which you come to both technical and stakeholder consensus around that, and the earlier you do that -- when you do that around emerging technologies in the utilities program, by the time you get into Code, you know, Building Codes and Standards, you have some agreement that is based both on optimum technical specifications and the business model.

And I think we have those processes, we have international ANSI standards and ISO -- I forgot the number that goes with it -- that have ways to get there; in fact, our Codes procedures are ways to get there. It's more about process than me as a -- what do I know about solar saying that NABCEP or the Electrician's License, or what -- I don't think you should designate me as the --

COMMISSIONER MCALLISTER: No, no, don't worry,

I guess my -- I'm really just leading up to say it would be great if those sorts of process and policy recommendations could be a part of any formal comments you submit because it would be good to have that in the record and help us build the rationale behind a decision, or formal development of that idea in the IEPR. So, thanks.

COMMISSIONER PETERMAN: And I think, at least probably about two years ago, Massachusetts did a study looking at certification, particularly for solar PV, whether NABCEP, or Electrician's License, Contractor's License, and the relative quality of system installations. So that might be something good for staff to pull up or see if there's been any updates directly dealing with that question. Thank you. So let's move along to our next speaker.

MR. DUVAIR: Very good. Okay, Rhonda Mills, you're going to speak next and I'll have all of our panelists introduce themselves to sort of speed things along. So, Rhonda, do you want to say a few words about yourself?

MS. MILLS: Thank you, Commissioner. My name is Rhonda Mills, I'm the Southern California Program Director at CEERT, the Center for Energy Efficiency and Renewable Technologies. We're a nonprofit coalition

based here in Sacramento, and I'm the L.A. arm. And we're a coalition of environmental groups and renewable energy and efficiency providers, and we do public education, decision maker education, and you know, policy and regulatory intervention at the agencies here and at the PUC. I do a lot of work locally, too.

I came into this field of renewable energy kind of by accident, but I came by way of the U.S. Navy, I used to fix Aircraft in the Navy in the '80s, and when I got out, I came to California and started going to college, I met the Director at CEERT, and I was amazed at how much my education from the Navy translated into this career, and still every day it does. It's not something I wear a badge on my arm, but it does go to show that I didn't graduate from high school, and I don't have a college degree, but I did get a very good set of technical training, sort of commensurate with what you would get at a community college in Electricity, and they gave me a $40,000 jet aircraft and said, "Go for it."

But it translated well, those skills, and I think we can take under-skilled people and we can give them, even if it was a few months' worth of education on the basics on how you work on a power plant, safety issues, and those kinds of things. Those basic skills are, in fact, absolutely mandatory. If you talk to any

developer, they will tell you they can't let a guy or a gal onto the site if they aren't properly educated about safety and those sorts of things.

And there are a lot of different kinds of jobs, I would say, in renewables-wide, but, by far, when you look at large-scale renewables, which I'm going to focus mostly on, these are projects that are built with project labor agreements, with Union labor, there's very little unskilled labor on these construction sites, and certainly not in operations, either.

I'm going to whip through a bunch of my slides because I do this presentation a lot, but just to give you a quick set-up, you know, a couple of years ago when projects were really starting to hit the ground, and people were really starting to ask questions, especially of the current Administration in Washington, you know, what's going on with all these green jobs? And there were a lot of reports coming out, and I just wanted to do some calculations on what is happening here in California at a job site, and then, from that, what can we extrapolate happens the way she talked about at the grocery store or something. Next slide. And you can skip through some of these.

You know, we have great wind in California, the best solar in the world next to the Sahara Desert and the

Chilean Andes, but it doesn't really matter out there because nobody lives there. We have enough geothermal in the Salton Sea in Southern California alone to take San Onofre out of commission and replace it with carbon-free 24/7 power. I think that that's a really important job set, opportunity in the future. Go ahead.

And now, you know, the Commission and other agencies and stakeholders are really starting to look back at biomass as a resource, obviously as an agricultural state you can see that there's a lot of different waste streams that can be turned into fuel and power and these are technologies that would require a lot of ingenuity; you know, it's not rocket science to turn a waste stream into a fuel, and into electricity, but it does take some ingenuities and, if we did the right kind of plants that weren't polluting plants, we could be deploying them up and down the state and really supplement our natural gas and our other baseload resources. And that's just a CEC slide that shows the existing biomass plants already. Go ahead. And click it a couple more times because I have a few pictures.

So distributed generation, as opposed to utility-scale is a huge untapped opportunity in California, let's just forget solar for a second, I'm not talking about solar, I'm talking about fuel cells, I'm

talking about, you know, even microturbines, and now some of the clean engines that are out that are so clean you can lick the exhaust pipe, okay? And so you can be turning farm waste, you can be turning trash waste, you can be turning a lot of different kinds of waste into fuels that these machines can run on.

Now, once again, we need some ingenuities, we're still working on refining, it's still expensive, but this is stuff that we can do and, frankly, if we can't figure it out in California where we figure out everything smart that the world does, I don't know where we can figure it out.

So I did some research, this is a map that shows some of my case studies, a color coded chart, but you can see that's Southern California, it's Kern, it's San Bernardino, Riverside, Imperial, etc. And what I did was I went to the developers themselves, and all their documents that they filed here and at the County levels, and I asked them, you know, in order to build your power plant, what kind of workforce do you need? What's the composition of it? And how big is it? And how long are they going to be working? And then, how many people do you need to run it after it's built?

And we learned, you know, that it takes a lot of very skilled labor to build these projects and that

they take years each to build, as we're starting to see now as these plants are deploying around the state.

So this slide is a little bit hard to read, but there's the two green ones are geothermal plants on top and, you know, the top one, 162 megawatts, this is not in construction yet, but that's a large geothermal plant vs. the other one underneath it, 50 megawatts, that one is also not in construction, but there's a couple that are exactly that size, so you can see what an average geothermal plant is going to be put 90 people full-time to work for three years building the plant.

So this is a basic round-up of the geothermal jobs and you can see that list of jobs, you know, these are skilled labor all the way down the line, except maybe in Managers and professionals, and so those are college educated, and there might be a few unskilled laborers, but if we were just going to build two 100 megawatts, you know, it would take three or four years and it would be over 800 jobs on peak.

And that's one important note about the construction of a renewable energy power plant is renewable power plants tend to take quite a few years to build, they take quite a few years to develop, as you know, everybody is in permitting and engineering and finance for years, entitling their properties and stuff

like that, then, when they get everything together and they hit the ground running, you have these massive peak month windows of employment, so the average might only be 400 over four years, but I guarantee the peak window on those two is three years, so really you've got over 800 jobs for three years building two power plants. Go ahead.

Those are some cool pictures of crazy people that get really high up in the air for a living. One more time. So, again, you can see this workforce proposition, you guys down on the left, these are all the standard labor trades and high skilled, and actually high paid workers, even if you go to the laborers and the assembly workers on a wind project; these are wind jobs right here, you can see that it's one of the lower job sets there, so these three wind projects are actually, I think, all in construction right now, so you've got over 1,000 megawatts, you've got a thousand people on the job.

And if I can just tell an anecdotal story about Tehachapi, sort of going with what you were talking about with the market. So, when they built the wind hub transmission substation, and a bunch of the projects started really rocking and rolling a couple years ago, there was a guy in Southern California that owned a lumber store in Cathedral City, and he said, "Hey,

they're building these wind farms up in the Tehachapi's, maybe I should go open a little hardware store up in Rosamond." Right? So a week after he opened his store, his secretary walked in and she said, "You know, this purchase order came across the fax machine just now, but I think there's a mistake on it, you might want to call them." And he says, "Well, what does it say?" "It says they want a $10 million credit line." And so he called the guys up, it was Terragen, and they're like, "No, sir, we're going to need that $10 million credit line. We expect we're going to need some extra hammers and stuff like that." So that guy's business is, you know, that's just one project, right? Go ahead.

COMMISSIONER PETERMAN: Rhonda, can I interject and ask a question? If you can go back to that slide before? I was looking at these last couple slides, and I was wondering where like biologists would fit in, for example, in this?

MS. MILLS: I didn't --

COMMISSIONER PETERMAN: Especially just for the projects in the desert and the Tehachapi's in the area, there are a lot of things related to biological resources, cultural resources, and I was just thinking about that, it's another job aspect.

MS. MILLS: I kind of folded them into two

places in all of these bar graphs that you'll see, they're kind of folded, you guys, into the one called "Managers and Assistants," or "Admin and Support Personnel." So they're a little bit folded into that.

I was at the BrightSource Ivanpah project a couple of weeks ago on the California border, that is an amazing project and there are -- I'm working from memory -- I think 36 full time biologists on the ground there right now working, and they've been there already over a year and they're going to be there for a few more years, that is a fabulous, fascinating site. I recommend anybody take a drive down there and look at what, you know, power towers. I'll go into it a little bit, but that's not rocket science either.

The beauty of renewables, not only does our workforce translate, you know, you can take a cement mason and you can put him in a shopping mall, or you can put him on a wind farm, he's still pouring concrete with rebar and he has to have his skill set. But -- I lost my quick train of thought there, anyway, go out to Ivanpah, you guys. It's really amazing what they're doing.

Oh, I was saying, you know, except for a couple of technologies, you know, all we're doing when we make electricity is we're making steam somehow, we do that with coal, and with gas, and with oil, with nukes, and we

do the same thing with solar, or we use solar thermal, and geothermal, and power towers, you know, you're just using out-of-the-box technologies, for the most part, especially the turbines, you're making steam somehow, and then you're running the device. Go ahead.

So hit it a couple more times because there's some highlights that come up. So this is a slide from a report done by Dr. Robert Frost [sic] (Fountain), who is a Professor Emeritus at Sac State, and I just wanted to point out to you a couple columns, the column on the left there called "Total Revenues to Businesses, Governments, and Households," this is from one wind farm, the Pacific Wind Project, it's one of my case studies, the 20-year total for income is $165 million from that one, I think Pacific Wind is 150 megawatts or something, right around there, so very large receipts coming in, including sales taxes of over $3 million and property taxes to the state of $82 million. Go ahead.

So you guys know a little bit about these technologies, but I just want to say one thing that, you know, again, virtually all three, except for photovoltaics, but the other three are making steam somehow, okay?

And here's a list of some of my case studies that are using solar thermal or photovoltaics, some of

these projects are changing, but the ones that I bolded, like Genesis and Mojave, these are in construction right now, 250 megawatts, employing 500 to 1,000 people a month. There's a reason why, if you look at the case study of Abengoa's Mojave Project and then you look at Nextera Genesis Project, they're the same size, but you'll note that the average jobs per month is a way bigger number for Abengoa, do you know why, Commissioner Weisenmiller? Because they use two turbines. So instead of one 250 megawatt turbine, they're using two turbines, it required two fields to build, more jobs, more work, blah, blah, blah.

This, I wanted to talk a little bit about DG and I'm going to rush through here. This is the biggest rooftop built in the United States in 2010, it's in Southern California, it's on a Costco, it was built by PermaCity Solar, one of the top 20 installers in California. Go ahead.

One more time, see how big that is? Okay, hit it a couple times. This is a carport in El Monte, California, that a bank built, there's solar on top of that pretty carport, and this is a great building that the Community Redevelopment Agency and some private partners built in Santa Monica, and I just wanted to show how innovative they used the solar panels both for -- it

powers the garage and all the common facilities, but they used it in an aesthetic way, and then they wrapped it around up on the roof, and they've got a little coffee place up there for the tenants to sit, it's a really interesting project. Go ahead. One more time.

So in my case studies, I surveyed two companies, PermaCity Solar, and SunPower. And we came up with an astonishing number of jobs and actually income, too. I think these numbers are very very solid. My case studies, there's only like seven case studies averaged out here in my research, but the companies are so experienced, they've done so many projects that they really know how to do this.

So, again, you can see that it does involve a pretty high skilled labor force, and some -- like you see that field called the Solar Field Craft? That's actually a job designation that the Energy Commission created several years ago, and that kind of means -- it was really created for the power towers and the trough guys, it's the guys that are adjusting mirrors, calibrating, stuff like that, but it also folds into the PV field, too.

So maybe some of the Solar Field Crafts and the Assembly Workers are semi-skilled, but the rest are pretty high-skilled. So if we were going to build 10 PV

projects at three megawatts, each, we would get 500 jobs per month building those and it would take about six months to build those 10 projects if you did them all at once.

And from those same 30 megawatts, the year one construction earnings would be $21 million and, annually, the O&M earnings on those 30 megawatts would be about a little over a million dollars annually, and then you can see all the tax receipts to the state, even with solar tax abatements at the Federal and State level, there's still a very significant amount of income that comes in tax receipts.

This is, after Governor Brown announced that he wanted to do 12 gigs of solar, or distributed generation, I went back into my research and I tried to multiply up the math, I -- these are very round numbers, you guys, but I still have a lot of confidence in them, so if we were going to build 2,000 PV projects that are 3 megawatts each, which is sort of the goal where the Governor is getting, right, let's cover all the big roofs in the parking lots and stuff like that, so we would get 10,000 jobs over 10 years, so it's 1,000 jobs a year, you know, quite a lot of jobs.

COMMISSIONER PETERMAN: Rhonda, this is all really interesting. I was wondering if we can maybe move

a little bit faster just because of the time issues.

MS. MILLS: I'm almost done, and I just was going to show you my last one which is that, you know, if we did half of the Governor's goal in PV of 3 megawatt installations, you would get a $4 billion construction payroll to build them.

And then, go ahead, go ahead, these are just some of the solar thermal jobs -- I have one more slide I want to show you -- go ahead.

COMMISSIONER PETERMAN: Is it Slide 31?

MS. MILLS: That one. That's the slide that I think is really important. This slide, these are the actual salaries that Abengoa is paying their operations and maintenance crew, their 68 people that are going to work at Mojave down in the middle of nowhere, and their average salary is going to be over $92,000 a year. So I just wanted to show that.

The rest are just slides that talk a little bit about the unemployment, but I think the major takeaway is that, with or without the recession that we've been in and that we'll continue to be in for a while, the utility sector, the new energy utility sector, is one of the only growing economies in the country, and certainly in the United States; and, absolutely, in these kind of Counties which are suffering the highest unemployment rates in the

state, those are two years ago, those unemployment rates, they're all higher. So there's a pathway and there's a place to take those men that aren't building subdivisions anymore.

COMMISSIONER PETERMAN: Well, I'll just ask a follow-up question and I would ask if you would move to Rhonda's next slide, I think that's a pretty interesting one where it lays out just, again, those counties and some of the job losses, and at least the job opportunities you've identified through your CEERT research.

Just a general follow-up question, and perhaps you can submit this just in your formal -- into some comments to the Docket, and for -- it would be interesting to know for the 14 projects, or if there's 14 companies associated with that, what share of the industry they represent, particularly in California, because you've identified projects with some of the largest developers, and it's good to get some sense of how typical those results are.

MS. MILLS: Yeah, well, for sure California has attracted the biggest and best in the world. That's why you have the Abengoas here that have built Spain out and stuff. You know, some of the stuff that's happening at the ISO and the PUC that is meant to create a strict

criteria to help create a development community that is strong, that can really go forward with the projects they're proposing, there's very hefty deposits being required to be put down, which you're going to see is, especially at the end of this month, you're going to see a huge constriction of companies and renewable energy projects, you're going to see 40 or 50 percent fall out of the cluster for a queue, for instance, you're going to see a lot of those projects that were started by small companies, start-up companies, medium-sized companies, they're going to get swallowed up by the big renewable companies that have the bank accounts to be able to finance these projects.

In a way, some of the stuff we're doing at the agencies to vet developers and push forward the best projects is actually, to me, stifling business a little bit, it's making it a little hard for the little guys to compete with a mid-American, or an Avestus, or SunPower.

COMMISSIONER PETERMAN: Thank you for that --

MS. MILLS: Sorry for taking all that time.

COMMISSIONER PETERMAN: Well, no, there's a lot to cover, we try to jam a lot in a short period of time, and I will say we did have a workshop looking at interconnection and talking about the ISO queue, we're having one next week on Financing, and so your comments

are all welcomed and appreciated. Thanks, Pierre.

MR. DUVAIR: Very good. Okay, we're going to switch the order a little bit and go with Marshall Goldberg because he's going to talk about the JEDI model, and then Lynn Billman from NREL has some applications to that model in her presentation.

So, Marshall, do you want to tell us about yourself?

MR. GOLDBERG: Sure. My name is Marshall Goldberg, thanks for inviting me here. And my business card says I'm a Resource Planner, and for most of the last 20 years, I have been focused on energy efficiency and renewable energy economic impact analysis. I should also say that conventional energy is in there, as well. And I have been working for, I have my own firm, MRG & Associates, and I've been working as a contractor/ consultant for many state agencies, Department of Energy, National Renewable Energy Laboratory, State of Illinois, State of Georgia, State of Nevada, and it runs the spectrum from Energy Divisions to Economic Development Departments because my niche is Economic Impact Analysis and looking at the kind of data that Rhonda was just talking about, and converting that into models and to analysis.

And here today, I'm going to talk mostly about

the JEDI models, Jobs and Economic Development Impact Models that I'm working on and have been designing and developing for the National Renewable Energy Laboratory. And they were using some of the analysis that you're doing here, and they've been used all over the country and actually all over the world they're being applied in a lot of different context. So we can jump right in.

Oh, I should also say that I do a lot of work, as well, kind of on a policy level, for a lot of the really big think tanks, Union of Concerned Scientists, I do most of their Economic Impact Analysis, I did a lot of work for American Council for Energy Efficiency, Energy Efficient Economy, Southwest Energy Efficiency Project, I've done work for the Energy Foundation, so that's kind of my world that I've been working in and taking the kind of information that we're hearing here, and converting that into mechanisms, analytical tools, so that we can do this kind of analysis.

So let's move forward. Obviously, there is a clear connection, I realized that I'm maybe preaching to the choir here, but not everybody understands the connection, and the connection from the energy and jobs isn't just those specific jobs that are in the construction field, that are either tied directly to energy skills, those kind of things, but they're

certainly in the supply chain, which relates to manufacturers, it relates to truckers, it relates to everything you can imagine, and their suppliers.

And then, of course, there are the induced jobs which Patrick has mentioned, and others have mentioned, and those are when we all spend our paychecks, we spend it on buying things, buying food, all those kinds of things, and that gets spent in the economy. So I'd like to characterize this whole discussion around spending because it really is about spending, whether it's for energy efficiency, or for renewables, or for other kinds of projects.

So the JEDI model, first off, I want to let you know, provides the gross impacts, so what that means is that it does not look at net impacts, so what happens if we put in a wind farm over here, and a certain amount of money gets spent, $20 million gets spent on that, it doesn’t look at what didn't get spent, it doesn't look at alternative spending, so it's a really important distinction whether it's the JEDI model, results you're looking at, or any other kind of model, whether it's net or gross jobs. So, please, always keep that in mind.

So the JEDI model -- models, I should say because there are a number of models -- it started out as something that policy analysts, researchers, university

project developers, a number of people wanted to have models that they could do analysis with, rather than just call me up and pay me to do a site-specific project analysis for somebody else, they wanted to have something that is kind of an off-the-shelf, there really is not an off-the-shelf -- or wasn't an off-the-shelf model that was energy-related, there was a lot of Input-Output models out there, different kind of analytical models, but they really weren't energy specific. So, one of the goals was to create energy specific. So, I'm going to kind of rush through these because there's a lot of information in here.

So right now, we have a solar PV model, we have a concentrated solar power model, we have on-shore large wind -- I make that distinction because we're about to have an offshore wind model -- marine hydrokinetic, which is mainly emerging technologies, wave, ocean technologies, and real small hydro instream kind of technologies. We have a corn ethanol model, we have two biofuel models, corn ethanol and cellulosic ethanol, and working on some adaptations for that.

We also have conventional models, these are all of the suite of JEDI models, we've got a natural gas and a coal, and one of the big emphasis for developing those was so that we could do a net type analysis, so we could

say, "Well, if somebody puts in a wind farm or a PV farm, and a coal plant isn't going to be built, what are the impacts going to be?" So we could net those out, so we put together natural gas coal models. Next slide, please.

Okay, we have a number of models that are in process and are very close to completion and that's an expanded PV model, which actually looks at scenario type analysis, so that you could analyze residential, commercial, industrial applications, all in one model, and you could do that over a long-term, meaning a certain amount gets built in certain years, and what kind of job impacts we'd be looking at.

We also have an offshore wind model that's about to be brought to the public, we also have a small wind model because it's not just about utility, it's about households, small businesses, putting small wind turbines on their property, we want to know what kinds of impacts we're looking at from those.

We have a biopower model that is looking at the electricity oriented, it's not a biofuel, but it's looking at biomass to create electricity.

We have a geothermal model, we have a conventional hydro model that we're working on, a petroleum model looking at when petroleum refineries are

built and operating, and then kind of bringing some of those together because, the reality is, we don't have transmission capabilities all over the place where we want to put some wind, or we might want to put some large PV facilities, or even geothermal for that matter. So we put together a transmission model that we're working on, that will look at what are the impacts when transmission lines get built.

So the key design features of the JEDI model were we wanted to understand the statewide or local economic impacts that occur from building these plants, so we've got the short-term construction-related impacts, and then we also have the operations and maintenance phase, which are 20 to 30 years, depending on the plants, depending on the location, so we wanted to understand the differences, once again, of short-term vs. permanent ongoing jobs.

We wanted the model to be available to a broad range of people, we wanted to have default information in there, so it wasn't just a model that, if you didn't have clear information on the cost, and the numbers of jobs for different sectors, that you would be able to run an analysis.

So that's an important point and I want to spend a minute here. The kind of work that we've just

heard about going to plants and getting all that detailed information we've been doing to develop the JEDI models, to get really good default information to load into the models, we surveyed developers to get their information on where they're spending their money, and whether -- not just the construction workers, I'm talking about, you know, where they're getting modules, where they're getting turbines, where they're getting other kinds of equipment that they need, whether they're getting it local -- and local is typically state-level, although the model has capability to do a county-level analysis, as well.

So a key to any model, and the JEDI model is not that it's just -- at least for us -- that it wouldn't just be a black box, that is kind of one of the biggest criticisms of a lot of Input-Output models, so one of our goals was that not only would people be able to look at the model and see the kind of analysis that was done in there, the kinds of information that go into it, but also make changes to that, so there's a lot of flexible input options within there and, of course, we added a user section where somebody could do different kinds of analysis like a county-level analysis. So, next slide, please.

Okay, so who uses the JEDI model? Well,

obviously the Energy Commission used it recently and I provided some support for that through my work with NREL. Resource planners use it, a big use of the wind model has actually been County Ag Commissioners, who are looking at Farmers, Ranchers that are looking at other forms of income that they can accumulate on their land, so Ag Commissioners have been using the model.

I went to Nevada and talked to some Commissioners there about using the model. They are trying to understand what the benefits are that can accrue to Ranchers, Farmers, small businesses, these kinds of things. So the model allows that capability.

Renewable energy advocates are using the model, Project Developers are using the model, I get calls from Project Developers -- I don't typically do that kind of analysis for them, I don't really set myself up as doing the analysis for Project Developers so they can go to, whether it's the Planning Commission, or Board of Supervisors, that level, but I do provide support for others to use the model. I mean, I do occasionally do some analysis for different projects. Okay, I know I'm quick on time here, so let's go.

Okay, so the model can be run with a minimum amount of information, meaning what the location is, year you're going to construct it, and the system type, and

how many megawatts, how many kWs, that kind of thing, or if you have a lot more detailed information, you can enter that and do a much more specific analysis.

The methodology, we call this Input-Output, or Multiplier Analysis. And we can really think of that as, when money gets spent, those expenditures go into the economy and they're spending, and we sum those impacts, direct -- go ahead, next slide.

Okay, so we've got direct, indirect, and induced impacts here. The direct are really right on-site, the indirect are more the supply chain, upstream, and induced are what we talked about before, the spending of wages. Okay.

So here's just a quick graphic of that ripple effect, or multiplier effect that we're always talking about in terms of modeling on-site impacts, or direct local revenue supply chain, and induced impacts. Next slide, please.

Okay, these benefits, they really depend on the extent to which the expenditures are spent locally. So we often hear about large expenditures, but how much of that is really spent locally, and I think Patrick alluded to the fact that we've got these impacts, but where is the manufacturing coming from? So the model allows for that capability to really understand and to analyze

whether the manufacturing happens locally. The default in the model is that it's not manufactured locally because that's really typically the case, California is an exception in some of the technologies, but not all of the technologies.

The kind of outputs we get from the model are employment, wage and salary income, economic activity, and personal expenditures. The kinds of summary impacts are for project data, all the detail and then, of course, the jobs, earnings and output that accrue from the types of projects.

Okay, just a number of assumptions to keep in mind, locations, it really can make a difference, financing arrangements make a difference, site-specific factors.

The information in the model are averages, the default are averages, they're reasonable expenditures based on surveys of project developers. A key point here is to make sure that we have a model that has real on-the-ground data and that we're updating it every -- some models get updated every year when we get information, some, it's every two years, it really depends on funding.

And the key with the model is it really depends on the availability of local resources, so if you have a big project coming in and a construction company is from

out of state, and they're bringing in their construction workers, you know they're going to spend some money at the local hotels and food stores and restaurants, but a lot of that money leaves the state and it's the same with manufacturing, as I just mentioned. If the money isn't spent, in this case in California, California doesn't get that benefit, at least not the full benefit.

So I always recommend, when people are using the model, the extent that you can localize the model, knowing where all those local resources are available, you can do a much better and more accurate analysis.

And just a really quick look at the model, it's a spreadsheet-based model in Excel, we have one here for PV, and there's capability to do residential, commercial, or utility-industrial, and those white cells are where people can do inputs, you can do a more defined detailed analysis by incorporating real detailed costs that you know about, or you can use the average values. Next slide.

Okay, then there's other parameters that allow the user to identify the types of financing, and the tax parameters, whether there's sales tax exemptions, or whether there's property taxes, or property tax exemptions. And we're also able to put in wage per hour and player overhead costs.

This is all by way of telling you that there's lots of capability, it's a very flexible model based on real on-the-ground data, and here's some of the summary impacts. People use the model to do a lot of different kinds of analysis, whether it's state, county level, they compare it with other impacts that might be from a natural gas plant, or a coal plant, I've done a number of those myself, types of ownership is another option within there.

So, that was a whirlwind of the JEDI model and it's available for free online through the NREL website, and we have a lot of users out there; we spent a lot of time and we've expanded efforts for validation of the models and we got very good results and, obviously, doing quick back of the envelope calculations -- Rhonda was talking about hers -- and we're pretty on target, so it's always good to see that on-the-ground data and verify with the model because that's kind of our goal, for it to be a real accurate model.

COMMISSIONER PETERMAN: It's nice to have that confirmation. Great, Marshall, thank you. That was really interesting and we'll take advantage of using the JEDI model more.

One of the areas, in particular, I'm interested in is the supply chain, the local supply chain

opportunities, and I was wondering if your model can show that, for California, and then comparing across wind and solar thermal and solar PV, if one technology more than another utilizes more State resources. And so, in particular, let's take solar PV and modules, if the modules are sourced in California, is the glass also sourced in California?

You know, if there are certain, I think, inputs to the actual materials we think about as renewable energy materials, then we may have a competitive advantage in, and that's the type of information we as a state would be interested in knowing to understand where we can continue to incentivize these industries.

MR. GOLDBERG: Okay, most of the existing models did not have that. As I said, kind of the default is that most of the supply chain is not local. We do have some models, we're working on a new model for PV that is incorporating that kind of information because we realized -- we've learned that that's a key factor, that locations don't necessarily have that information, so we're going out there and finding out about that supply chain so that the information can be in there, it can be incorporated within the analysis.

COMMISSIONER PETERMAN: Thank you. We'll move to our next speaker.

MR. DUVAIR: Okay, we have Lynn Billman from NREL -- oh, no, we were able to get Dr. Morgenstern online. Do we still have him?

UNIDENTIFIED SPEAKER: Hi, he just stepped out for one minute, I'll go grab him.

MR. DUVAIR: Dr. Morgenstern works for Resources for the Future, it's a think tank back in Washington, D.C. It sounds like he may be back in the office. And he doesn't have a presentation, so he'll just be speaking about his research on jobs quantification.

COMMISSIONER PETERMAN: Yes, please feel comfortable to get up and stretch, take a break.

DR. MORGENSTERN: Hello? Rich Morgenstern here.

COMMISSIONER PETERMAN: Hi, Dr. Morgenstern, this is Commissioner Peterman. Thank you for joining us and taking a break from your busy day, appreciate you participating today and looking forward to your comments of five to 10 minutes, or whatever you're comfortable providing. Thanks.

DR. MORGENSTERN: Sure. Well, thank you very much. I'm sorry to be dodging in like this from so very far away, but I'm actually -- you might be interested -- I'm at a meeting at the EPA, the U.S. EPA in Washington,

that it's conducting looking at job impacts, and I'm presenting some of the same works that I'm going to be talking to you about.

So let me start for a minute on my background, just so you understand. I'm an Economist, I've been working in the area of energy, environmental issues for actually a long time. I'm now at Resources for the Future, which is an independent think tank in Washington, and the work that I'm going to be reporting to you on was done -- actually, it was done about a decade ago, but believe it or not, it's now considered among the more current papers on the subject because it's a very difficult area to study, and there have not been that many new studies.

So the work that I'm going to talk about is trying to understand the jobs impact which environmental regulation has had, in other words, have environmental regulations led to job losses, have they led to job gains? And how confident are we of the results? So let me make a few points that distinguish this work from some other things, and explain what this work will tell you and what it will not tell you.

First of all, this is an empirical study, it's not a model-based study in the sense that it is not taking average relationships and piecing them together,

and then making a projection of the future. This is actually a look back at what the actual impact of regulation has been.

The focus is on -- when I use the term "regulation," I'm referring to environmental regulation, as we think about it for air, water, waste, things of that sort. Third, this is a national study, this is not a state-level study, so this is giving you the relationship, or the results, of what happens on a national basis when you impose environmental regulation.

And this is a study of four particular industries; these happen to be heavily regulated industries, so perhaps there are implications for other even less regulated industries, but the four industries that we have looked at are open paper, refining, plastics, and iron and steel.

And the period of our data is actually from 1979 to 1991, and you might say, well, gee, that seems like awfully old information, and of course on some level it is, no doubt about it. At the same time, it's the kind of situation that we can actually measure what happened, so we don't have to simply discuss hypotheticals, but we can look at the actual results of regulations.

So this study is not specific to California,

unfortunately, it is not based on brand new data, it is not applicable to all industries and, as I understand your interest, it is not specific to the issue of carbon; this is really talking about environmental regulation as conventionally construed, which, as I say, focuses on air, water, and waste regulation.

So what makes this study a little bit unique is that we didn't, as I mentioned to you, use average relationships, but we actually were able to get confidential survey data from the U.S. Department of Commerce, and they conduct a series of surveys and these surveys are routinely conducted, and they go into the monthly projections and the quarterly projections that are made on Gross Domestic Product, and various other economic indicators.

So underlying that aggregate information are a bunch of very detailed specific surveys and these surveys contain confidential information, so in order to do research using this information, you need to become a sworn Census Agent, as it's called. You need to adhere to certain criteria and disclosure, but nonetheless, you can disclose the statistical results that come out of your analysis and that's what I'm about to mention to you.

So basically, we did this study with this data,

this highly refined, highly detailed information that was collected some years back and is focused on conventional environmental regulation. And the answer that we come to, in a nutshell, is that for these heavily regulated industries -- this is not for, for example, the pollution control industry, or it's not for renewables industry, it's not for industries that might be obvious winners from regulation -- these are really from industries that you might expect might be losers from regulation just because they are facing competition from, certainly, around the world.

But what we found is that there are actually three different effects in play here, the first effect is that, when you regulate, you tend to raise the cost a little bit, and that tends to get attached on to consumers and ultimately there could be a reduction in the demand for the product. So that is one element of the puzzle.

The second element of the puzzle is that the new pollution requirements themselves require expenditures by industry, and some of those expenditures are for laborers, for workers. And so you would expect that to be an unambiguously positive effect.

And then there's the possibility, the third effect, that there could be a shift in the capital

intensity, or the labor intensity, of the operation based on the environmental regulation. So we looked at all three effects, we call the first one the "Demand Effect" or the "Output Effect," the second one is the "Cost Effect," and the third is the "Factor Shift Effect." And when you put these things together, what we found was that the overall impact across the four industries was negligible, it was actually a negligible gain in employment, and we found that it was about 1.5 jobs gained for every million dollars for environmental expenditures; however, I don’t want to emphasize the gain part because, from a statistical sense, it really wasn't statistically different from zero.

So the way we interpret the results are that the employment impacts on these heavily regulated industries that we observed over the period of the late '70s to the early '90s was negligible. And we went back over in time and we said, what happened on a national basis during that period of time? And, of course, the answer is just that now there was a large reduction in manufacturing and employment during that period of time. In fact, the actual reduction was about 600,000 jobs.

And the question was how many of those 600,000 jobs could plausibly be attributed to environmental regulation, as opposed to other causes, like differential

labor costs, a whole bunch of other productivity issues, things which could have dominated the situation. And what we found is that, of the 630,000 jobs that were lost during that period of the late '70s to the early '90s, perhaps as many as 7,500 jobs could be attributable to the environment. But, of course, that could be a gain of 7,500, or a loss of 7,500, so basically it was a quite small number as part of the total.

And our overall conclusion is that environmental regulation, based on this after the fact, or ex post analysis, had a truly negligible effect on employment in the United States during the period which we studied.

So that's really the core of the comments I wanted to make and I would be happy to take any questions that you have.

COMMISSIONER PETERMAN: Thank you. I'm just sitting here digesting, I haven't read your work previously and I'm just thinking about it, again, in the context in which we're discussing these issues.

So -- and you pointed out the parameters of your work, one being that it is a national study, and so any insight into -- we're looking at regulation on a state level, so, you know, higher requirements, for example, for renewables in California vs. other states,

how that more sub-national focus might result in different results.

And then, the other thing I was thinking about, too, is the industries you're focusing on don't really have other perfect substitutes and I was just thinking in terms of renewable energy with there being substitutes through fossil energy, for example, about what implications there might be in terms of not having a reduction, or maybe having more elasticity between those two and just how that might affect some job implications.

DR. MORGENSTERN: Uh-huh, sure. Well, let me answer your second part of your question first. I would think that there are a fair number of substitutes for these industries.

COMMISSIONER PETERMAN: Okay.

DR. MORGENSTERN: There certainly are substitutes for the sources of these very same products because these are internationally traded products.

COMMISSIONER PETERMAN: Right.

DR. MORGENSTERN: And unlike electricity, which by and large is not internationally traded, the substitutes here could come from around the world and, so, pulp and paper, refining plastics, these are all commodities that are produced all over the world, and there are in fact many substitutes for them.

COMMISSIONER PETERMAN: That's true.

DR. MORGENSTERN: The state issue, I think your point, the implication of your question, I think, is correct certainly, that when you're looking at a national level you don't have the possibility of substitutions that could occur across states, so one would imagine that there are greater substitutions within a country than there would be among countries, that's certainly my intuition. And I guess there are some other studies out there that have suggested that, although, in fact, each one of them has issues associated with it, so there's not a crystal clear comparison one can make, but it's certainly highly likely to be the case that there are greater substitutions within the country than among countries.

COMMISSIONER PETERMAN: And then, the other observation I'll make is that, I believe from your study, the environmental regulations apply to all of the product, while when we think about renewable energy, it's a share of, and so there's not the expectation that right now 100 percent of all energy be renewable, so I'm just thinking about the extent of the regulation, if you will, as well as being a factor.

DR. MORGENSTERN: I think that's a good question. I think that in our study, certainly we talked

about regulation across the entire industry and, to the extent that you segmented a part of it and there was a way of averaging out the cost impacts across all products, then naturally the cost impact would be reduced.

COMMISSIONER PETERMAN: Thank you. Chair Weisenmiller, or Commissioner McAllister, any questions? We thank you for taking the time and we look forward to hearing about how your meetings in D.C. go. Good luck.

DR. MORGENSTERN: Okay, well, thank you very much.

COMMISSIONER PETERMAN: Thank you.

DR. MORGENSTERN: Okay, bye bye.

MR. DUVAIR: Thank you very much. Okay, Lynn Billman from NREL, and then we have Bill Dean from Cal/EPA, so two more speakers. Lynn

MS. BILLMAN: My name is Lynn Billman. I'm with the National Renewable Energy Laboratory in Golden, Colorado, a Department of Energy Lab, you can sort of guess our mission, renewable energy, energy efficiency advancement.

We have about 2,000 staff now, and about 90 to 100 of those are in the Strategic Energy Analysis Center, and I'm in that Center. So we focus on markets, policies, financing, supply chain, lifecycle assessment,

and jobs and workforce.

So I'm going to tell you a little about what we have been involved in that might interest you. The first slide, Jobs Analysis Tools, I'm going to talk about that for a moment, a couple of Jobs Analyses, a little bit of Workforce information, and you might from your comment, Commissioner Peterman, you might be interested in the Manufacturing Cost Analysis that we have going on now. So next slide.

I have two slides on JEDI which we can skip over, except I want to mention one thing, in addition to what Marshall shared about this tool, I was just running some statistics on our Web downloads, you know, unique downloads, so, how many different people have downloaded the models and used them; and in our fiscal year 2011, the figure was 2,250, and in fiscal year '12, I know we're not finished yet, but we're about two-thirds of the way through, that has gone up by two and a half times, we're on a projection of 5,800 unique downloads. So it just tells me how important your workshop is today.

Okay, you can skip that one, Marshall went over that stuff. New Jobs Tools and Process, Marshall mentioned the PV scenario in JEDI, I'd like to spend just a moment on the top one, on the Energy Input-Output Calculator. This is a tool that I hope is going to be

public within a couple of months and it is another Input-Output Calculator, but the most unique feature of it is that, one of the problems we have in understanding jobs and where jobs might go in the future, is how we will be manufacturing wind turbines, PV panels, anything like that, in five years, in 10 years, in 20 years. So this has the same kind of information we start with from the JEDI models on how a dollar of capital investment is broken back into industrial sectors, that's a very important part of doing jobs analysis, but this new tool has the capability to say, "I want a different cost input mix, or recipe, five years from now, and another different one 20 years from now because I'm going to assume increased labor productivity," for example, so we built in that kind of flexibility that doesn't exist anyplace else.

Okay, let's go quickly to the next one. I want to mention one study that was done recently in our group for the State of Wyoming. They were very interested in three areas of investment in their state in energy, nine gigawatts of new wind, nearly two gigawatts of new natural gas, and high voltage transmission lines to be able to export their extra electricity, $25 billion in investments, and they wanted to know what their jobs impacts was going to be. So we used two JEDI models and

invented a first-ever transmission JEDI model just for the State of Wyoming, and came up with some estimates for them.

Of course, we had to guess, you know, one of the important questions for California is, are the jobs coming from within California, or are these products coming from outside the state, and so on. And when you look at a state, an individual state like Wyoming, you have to make some guesses, so we worked with the local people there who knew their economy and used figures of 20 to 25 percent of the dollars for construction being invested in Wyoming and 31 to 34 percent for the operating dollars, and we came up with very healthy figures, 4,000 to 6,000 jobs during a 10-year construction period for all that work, and we've had many opportunities to go up and talk to Wyoming stakeholders about the study, and they were very very excited by seeing what some of these numbers were.

In the next slide, another analysis that's been kind of interesting to folks, that we were finally allowed to release last month, so I can actually talk about it, there was a program -- part of the Recovery Act -- called the Treasury Grant 1603 Program, and this was dollars that replaced ITCP, yadda, yadda, you know the background, well, of course the question was how many

jobs came from that. Well, when companies applied for that money, they were asked to tell how many jobs that they create. Well, the numbers were really interesting, nobody had a lot of confidence, and so we put -- and Marshall is an author on this, along with one of our Analysts, we put Marshall and one of our Senior Analysts together -- and they used a national version of the JEDI tools and came up with some numbers that you see there for the number of jobs for what comprised about 90 percent of the different projects that were within that portfolio, we didn't cover everything because there's tens of thousands of projects, but we covered about 90 percent of them, and the numbers were not as high as the companies had claimed, perhaps not as high as some folks in the Administration wanted to see, but we think we can stand behind these as being very soundly grounded in real data coming from the industry over the last couple of years. Okay --

PROFESSOR ZABIN: How much was the grant program? Like how many dollars was that --

MS. BILLMAN: Let's see, what we analyzed was worth $9 billion. That was the grants. Now, the total investment was $30 billion worth, which would have been the grants plus private sector investments in all those projects, that's what was in the final report.

PROFESSOR ZABIN: This is like the gross, though?

MS. BILLMAN: Yes, these are gross, absolutely.

PROFESSOR ZABIN: So, I mean, how can you justify doing gross in a situation where, I mean, is it a Federal grant that would have not gone to Wyoming if --

MS. BILLMAN: No, no, no, this was a totally different project.

PROFESSOR ZABIN: I'm sorry.

MS. BILLMAN: Yeah, no, not Wyoming.

PROFESSOR ZABIN: It just seems to me that it's not -- I don't understand the meaning of gross in this context because investment funds would be used elsewhere and you do have to make the comparison, otherwise you're not --

MS. BILLMAN: If you had a projection of how else the Government would have spent those funds, we could take a look at it, but I don't know how you would assume that.

PROFESSOR ZABIN: Well, with IMPLAN, or any of the models, you're right, you don't know how, so you take it usually out of general revenues, but it is taxpayer funds that would, you know, whatever they do with it, it's being used in one direction; so, to somehow not count what the other direction would have been is, I

mean, we could do that for every project and then we'd have this huge boom because everything would be additive, and I'm just not understanding the usefulness of this without looking at the net. So I'm missing something here.

MS. BILLMAN: There are net tools out there, IMPLAN is not exactly a net tool, you can do econometric studies, you can do CGE, Computer General Equilibrium studies --

PROFESSOR ZABIN: Well, you have a choice of making IMPLAN in that tool if you take that revenue away from something else.

MS. BILLMAN: Yeah, you can if you know how to do that and I think that would be a very excellent study. This is what we could do with the tool that we had.

Let me go on to Solar Instructor Training Network. This is a little more, perhaps, related to your work this evening, but I just wanted to mention the project. NREL provides information to IREC, Interstate Renewable Energy Council folks, okay, they really lead this, but it's a great network of providers and trainers trying to help the workforce problems, if you're not familiar with it, I put the website there for you. Next slide, please.

The Solar Labor Market Analysis is really the

solar tech work that the lady back here mentioned, was a project between Solar Tech and NREL, and so I just wanted to make sure you were aware of that project, as well. So we don't have to talk about that.

Let's move along. Wind workforce is also an issue for us and the Department of Energy, and I just put this visual up there to remind me to talk about it, but there are a lot of different efforts underway in the wind community between the trade organizations in the schools.

Our Wind for Schools Program has been going on for a number of years that's introduced wind technology in the K through 12 levels, and that also is a very important area of work to us and to the Department. Okay, one more.

All right, this is a representative slide about a new area that we've been focusing on for the Department around the supply chain for PV. And our analysts have just taken the supply chain -- I could have done a 45-minute talk on this, alone -- they've taken that supply chain and dissected it in great detail from top to bottom and all the way across, in terms of labor, materials, and so on. Now, they've looked at it from a national perspective, but the techniques and approaches could also be applied within a state. They've looked at raw materials, the labor, the sources, export-import,

balances at every stage, who is supplying products in intermediate materials to whom, back and forth across the ocean, and of course our focus has been on solar, where China has been the topic in the news. They have studied differences in business strategies, differences in sources of capital, difference in investment risk approaches, and manufacturing subsidies.

And one of the interesting conclusions you can see in this slide, as you might expect, the parameters around jobs are very different in China vs. the U.S. And so one of the questions we've asked is, can China keep doing this? Can they keep this low level of job wages and they have discounts that the manufacturers get on their material supplies from the government, and all kinds of different things going on, and the challenge for the Chinese companies is actually the cost of shipping. The cost of shipping the modules across the ocean and the raw materials sometimes if they want to do it here, but the cost of shipping is quite large and very important for them to consider, and us to be aware of because it brings the cost to a lot more equal level between the two countries.

So I put on the bottom of the slide there the source material for this particular work, and on our website, if you Google any of those authors, you'll find

several other studies that you might be interested in around the supply chain work. And that's it. Hopefully this caught you up a little bit on your schedule.

COMMISSIONER PETERMAN: Well, thank you, Lynn, very interesting. I'm going to take a closer look at the report you just mentioned on jobs and manufacturing costs in China. One question about the transportation cost, do you have a sense of what that share is relative to the overall total module cost?

MS. BILLMAN: Yeah, could I have just a second?

COMMISSIONER PETERMAN: Sure.

MS. MILLS: I was very interested in that same question, and then I'm just thinking also that the Solar tariff is going to have a huge impact. I'm stunned by those numbers, to be honest with you. I'm more than shocked. I knew it was low, but I didn't -- you know, now we know why U.S. manufacturers and U.S. installers are tanking, you know?

COMMISSIONER PETERMAN: Well, you know, I found interesting your point about the lower cost inputs, as well, because I understood there was a difference in the labor, it was my understanding, that the processes for manufacturing were similar across the countries, and I assume that some of the material costs are similar, so I thought that was -- that was a piece of new information

for me about some of the material inputs.

MS. MILLS: Well, if I could just, while you're looking that up, I mean, I did a little research for the Schwarzenegger Administration and one of the things I learned from the manufacturers who make panels and turbines is that there's a huge price difference in steel, copper, concrete, in Korea it costs 30 percent of what it costs here, so like General Electric was making turbines on three different Continents, and then shipping them here, you know, so somehow that was still -- I mean, one of the components, I think the blade is made in Iowa, the motor is made in Germany, and the towers is made in Brazil. You know?

COMMISSIONER PETERMAN: Very interesting. Yeah, I think the new model that Marshall was talking about in terms of looking at some of those more supply inputs will be very valuable. And, Lynn, I don't know if you're ready or not -- if not --

MS. BILLMAN: Yeah, it works out to be about five percent is the shipping cost, and you have to even out some of these other things, as well, but that extra five percent can kind of tip things over, so it's a very extensive set of studies, and it's an area of research that we're definitely ramping up for the Department.

COMMISSIONER PETERMAN: Right.

MS. BILLMAN: They're very interested in doing the same types of things for other technologies, so please let me know if you have any questions, I can put you in touch with the authors.

COMMISSIONER PETERMAN: Will do, we may ask for some specific information about cost in California vs. the other states.

So, as is the case with these fascinating workshops, we are out of time, but not really out of time, in that we're going to still turn to Dr. Dean because we want to hear his presentation, ask him to try to keep it under 10 minutes if possible, and then we'll turn to public comment, and if there are any questions from the panelists, and I hope you will all ask each other questions during the break. And, again, very interesting presentations and I wish we could have more time for dialogue.

DR. DEAN: I'm going to do my presentation from over here because I'm going to use the laser pointer and I don't want to zap the eyeballs of the other panelists.

COMMISSIONER PETERMAN: That's very kind.

DR. DEAN: I'm Bill Dean. I work for Cal/EPA and my presentation, I'm going to move interchangeably between the Air Resources Board and Cal/EPA probably because I used to work for the Air Resources Board in the

Economic Study Section there until the end of 2007. Since 2008, I've been in the Climate Change Unit of Cal/EPA, but I deal daily with ARB staff; in fact, this morning, I was in one of their cubicles talking with them about this sort of stuff. So I understand I have a short time, so let's begin.

Okay, ARB uses E-DRAM for their economic impact analysis. E-DRAM is a computable general equilibrium model of the State economy. It was developed by Peter Burke at U.C. Berkeley, originally for the Department of Finance. And ARB learned about it and they've been using it. The "E" means it's set up for Environmental studies, "DRAM" means Dynamic Revenue Analysis Model. And ARB uses it for its major regulations and plans such as those listed there, basically any regulation that's more than $100 million, they use it for that. And it dictates the cost from one sector to another sector, or the savings that some of them have, and they use those as the inputs to the model, they put that in the model, and out comes impacts in terms of Gross State Product, Personal Income, and Jobs.

So this just shows you all the things that E-DRAM considers and it's a very busy chart, so I'm not going to go into detail on this. But I do want to focus on Firms and Households.

So in this picture, the dotted lines refer to the flow of dollars through the economy. The dollars are neither created nor destroyed, they just flow from one sector of the economy to another. So if you start with Firms in the middle here, you see that this little arrow runs the Firms' purchase factors, specifically capital and labor, from households, and then those dollars become income to the households.

Household expenditures on goods and services become revenue to firms. And firms are always buying intermediate products from each other, so the costs of one firm for an intermediate product becomes the revenue to another firm.

Okay, earlier we heard about direct jobs, indirect jobs, and induced jobs, so this is a picture of how that works. So the firm hires workers, spends money on labor, and that becomes income to the households. For example, a solar installer has to hire people, so those will be direct jobs, the indirect jobs are through the supply chain; so, for example, that solar installer has to purchase solar panels from an assembler, so the installer would buy the assembly, and that would go to the assembler who, in turn, hires people and those would be the indirect jobs.

And then, finally, because those people with

the direct and indirect jobs now have more money, they buy goods and services which go to other firms, you know, all kinds of different sectors of the economy, and those firms in turn hire other people, and so those are the induced jobs, and that's shown in the light green arrows there.

Okay, one of the applications of the E-DRAM was for the Renewable Electricity Standard. Now, three years ago, there was an Executive Order that told ARB to put together a Regulation for the 33 Percent Renewable Energy target, and for some reason, ARB called that the Renewable Electricity Standard. And they produced a staff report for that Regulation, and they produced the Economic Impact Analysis, which I'll discuss in a moment.

After they adopted the Regulation, now there's a new law passed a year ago which takes most of the program and signs it back to the Energy agencies and changed the name back to Renewables Portfolio Standard.

Okay, some of the things the staff report mentions is the cost-effectiveness of the Renewable Electricity Standard of about $200.00 per metric ton. And that's a very large number, that's larger than anything else mentioned in the Scoping Plan, with the possible exception of the high speed rail. They also suggest that the bill impacts for customers would go up

about $3.00 to $10.00 a month, depending on how much the customer uses it.

Okay, they ran two scenarios, they ran a High Load scenario and a Low Load scenario, and here they show the costs from one sector to another sector. And the right-hand column compares the 33 percent scenario with the 20 percent scenario, so for construction and manufacturing, more dollars flow to them, less dollars to fuel extraction because there's some -- the renewables displace natural gas generation to some extent.

So in running E-DRAM, you look at the results and you see that, for those five sectors that got mentioned on the previous slide, there's an increase in employment and that would be an approximation to the gross jobs created by the program. But if you look at the economy as a whole, all employment, there was a negative impact and that would be the net jobs. And that pattern shows up on both the High Load and the Low Load scenario.

Okay, if we compare that with the California Clean Energy Future, you see that, on renewable energy, it had a positive number for jobs and, as we discussed earlier, those are the gross jobs. Now, you notice something interesting, a pattern on the solar photovoltaic, you notice that for utility scale, it's .69

jobs per gigawatt hour, and as you go down to a smaller scale, down to residential, it's 1.31 jobs per gigawatt hour. So the smaller the scale, the larger the job-years per gigawatt hour. And I went inside -- I looked inside of JEDI and looked at the costs for these things, costs per kilowatt hour, and I noticed that the labor was a fairly small fraction of it, about 10 percent or so. Most of it, about a half to two-thirds, was the equipment and modules was the biggest part of that equipment, and that the jobs per gigawatt hours is probably roughly proportional to the dollars per kilowatt in there, so it seems that the more expensive the technology, the more job-years you get, and that strikes me as kind of interesting.

Now, if the cost of solar PV keeps coming down, then does that mean you'd have fewer job-years per gigawatt hour? That struck me as kind of a strange result, and I think that it goes back to the gross jobs and net jobs. What's missing here is the upstream jobs, the economic activity that doesn't happen. And that's represented by this red thing. You see, if the electricity rates go up, then ratepayers have less money to spend on other things in the economy, and that loss of spending is represented by this red arrow, so they spend less and, so, firms get somewhat less revenue and

therefore they don't have as many induced jobs throughout the economy. And I think that's how to reconcile the results from the ARB study with the results of the California Clean Energy Future.

So my conclusion then is, as long as renewable energy is more expensive than gas generation, the net jobs is likely to be somewhat negative. Now, factors that could mitigate that would be if you could infuse money into the program from outside, possibly, for example, through an interaction between the Renewable Portfolio Standard and the Cap-and-Trade Program, then that would blunt that a bit.

The Council for Renewable Energy is likely to continue coming down, so the economic impacts are probably going to get smaller in magnitude. In any case, the impact on the California economy is very small, we're talking about less than two-tenths of a percent. So mostly, these programs are just shuffling jobs from one industry to another industry.

And also, when I talk about negative job impacts, it doesn't mean that people who are working are going to get laid off, it just means that there will be a slight decrease in the growth of employment as we go along. And that concludes my presentation.

COMMISSIONER PETERMAN: Thank you, Dr. Dean. A

couple of observations and questions. First of all, based on your graphs, it looks like you had a previous career as a football coach, so I really appreciated that. One of the other conclusions I might -- or inferences I might draw -- from your presentation is that expanding load, you know, having a need for more generation is going to also result in lower job impacts. Would that be a correct read about how to read this High vs. Low Load scenario? Because I wanted to make sure I was interpreting the incremental -- so I'm reading the reverse to it, no, that's the right way, so High Load, you have more potential incremental jobs, is that the right read?

DR. DEAN: Yeah, the magnitudes would be larger.

COMMISSIONER PETERMAN: Right, the magnitude is going to be larger, so just thinking about opportunities related particularly to electric vehicles, something that we're talking about in the state as a way to increase load, even though we're not seeing load naturally increase, so that's just a trend to keep following.

And when we talk about jobs, we often hear interests that are sub-state, you know, concern about jobs in counties with high unemployment, etc., so does E-DRAM, can it focus down on a county level analysis? Or

is this truly macro at the state level?

DR. DEAN: Yeah, it's state level. With respect to the geographical distribution, if the solar plants are out in the desert, you'd see increase in jobs in that area where the construction is taking place --

COMMISSIONER PETERMAN: Right.

DR. DEAN: -- and where all the ratepayers are, that's where you might see a negative impact.

MR. DUVAIR: Commissioner Peterman?

COMMISSIONER PETERMAN: Please.

MR. DUVAIR: For the ARRA Programs, we are -- we have a contractor, KEMA, that's going to be looking at using REMI Inc. model, which can get down to the county level for sort of economic impacts, so it's a different macroeconomic model, but we do have access to tools that can look down at the county level.

COMMISSIONER PETERMAN: Thank you, that's useful. I think you've pointed out here, though, that the jobs -- the creation might be in one area, and the job losses in another. Thank you, Dr. Dean, if you wouldn't mind joining back with the panel.

So now is our time for public comment, if anyone -- I have one public comment card, so I'll turn to Michele Piller first. And then, if anyone else is interested in making a comment, just come up to the front

row, raise your hand, and if we have an opportunity, we'll also hear anything final from our panelists. Please.

MS. PILLER: Good morning.

COMMISSIONER PETERMAN: Good morning.

MS. PILLER: Or afternoon.

COMMISSIONER PETERMAN: Good afternoon.

MS. PILLER: I am an untraditional person here. My name is Michele Piller, I'm Executive Director of a community-based nonprofit in far northeastern California, from the Oregon border to Nevada County, Modoc, Lassen, Plumas, Sierra, and Nevada County. I also represent the Biomass Economic Recovery Group in Northern Sierra. We're a steering committee of stakeholders from seven Northeastern Sierra Counties, including Forest Service and lumber companies.

Plumas Rural Services is currently negotiating to purchase the Woody Biomass Power Plant in Loyalton, California. We're creating a new model of sustainability within a local region, so ownership stays local, most of the money stays local.

I also am the Program Committee Chair of the NoRTEC Workforce Investment Board Region, and I've been that for multiple years, very familiar with training. We are working to reestablish the existing woody biomass

plants in Northern California.

We're here today hoping to receive your support of these existing woody biomass plants as Bucket 1 renewable energy in California. Our challenges are many. The current focus on building new facilities is overshadowing the existing 10 woody biomass plants in Northeastern California, five are operating and five have recently closed.

Northeastern California is primarily a timber-based industry and has been for years. Bringing these industries back is the vital focus for this area. We have already lost 413 direct California jobs in the woody biomass. That, plus the multiplier effect, puts us in the thousands in one of the most remote frontier rural areas of California, for instance, Sierra County has 3,000 people, the woody biomass plant in Loyalton would create 70 to 80 jobs, that's a significant impact on an entire county, one, the smallest county in California, lives or dies by that biomass plant.

It's difficult to get infrastructure reestablished once it's gone, so as we talk about building all the new infrastructure, we have current existing infrastructure we should be using.

We have multiple high unemployment of timber and forestry workers in this region, and they're living

in one of the most energy rich landscapes in California, they don't need re-training, they just need to be put back to work.

Renewable woody biomass energy relies on a supply chain that provides the best job opportunity for rural Northern California. Within a 3,000 square mile area, we effect forest management for 2,000 square miles, and that's Modoc, Lassen, Plumas, and Tahoe Forest. We also effect recycling area in the Sacramento Area, itself.

COMMISSIONER PETERMAN: Ms. Piller -- I'm going to interject, I'll let you know that, in our four workshops leading up to this, we actually had some really great representation from the U.S. Forestry Service, Cal Fire, talking about both the opportunities for electricity generation, fire hazard reduction, and so -- and all that has been entered into the record, and it's also an area that we have been looking at in the Interagency Bioenergy Action Plan.

I appreciate your comments today, especially because we oftentimes do focus in our discussion about wind and solar, and with woody biomass, you're representing a part of the state that doesn't necessarily have as many of those resources, but it does have this one. And so I'm going to have to ask you to wrap up, but

I did want to let you know that this is on our radar.

MS. PILLER: We are -- woody biomass is 100 percent California created renewable energy, it is the only 100 percent 24/7 dispatchable renewable energy for baseload demand, and it can be ramped up and down, so we are a perfect complement to the solar and wind, and I thank you very much for your time.

COMMISSIONER PETERMAN: Thank you, and if you would like to just type up your comments in a letter and submit it to the Docket, we would appreciate that.

MS. PILLER: Thank you.

COMMISSIONER PETERMAN: Thank you.

MS. GREEN: Commissioner?

COMMISSIONER PETERMAN: Yes.

MS. GREEN: We do have one person on WebEx who would like to speak.

COMMISSIONER PETERMAN: Okay. Do you want to have them go next, and then any hands in the audience from anyone else who wants to speak? Okay, we've got one in the front and we'll have him after this? Okay, go ahead.

MS. GREEN: All right, go ahead, Pauline.

MS. MA: Hi. My name is Pauline Ma. I'm representing CleanTECH San Diego. And just something I wanted to bring to the group's attention --

MS. GREEN: Could you speak louder, please?

MS. MA: Oh, yes. Is this better?

COMMISSIONER PETERMAN: A little louder.

MS. MA: Okay, one thing that we have here in San Diego is an Edge Biofuels Training Program, and this is really aimed for job seekers and unemployed individuals looking to work in a high tech industry, so not just construction, you know, not just temporary placement, but actually getting into the high-tech biofuels sector, and we had partnerships with San Diego State University, U.C. San Diego, and also some of the Extension programs, and we are actually able to get some of the larger biofuels companies, such as General Atomics, Sapphire Energy, NSG Biofuels, several internships for our Edge students, and so some of them have been able to get jobs afterwards as a result of these internships, and our first graduating class just received a certificate in September and, in 2012, this year, we'll be launching a Masters Program, as well, for students that want to advance their biofuels training.

So that's just something that we thought could be a best practice that could be applied to other regions and, again, this is a collaborative effort, it's not just San Diego, it's also with the San Diego Center for Algae Biotechnology, BIOCOM, all the Universities, the San

Diego Regional EDC, Imperial Valley EDC, and it's just something that I wanted to share that I thought could be used in other regions, since it's working very well here in San Diego.

COMMISSIONER PETERMAN: Thank you. We appreciate you sharing that and, even if you could just send a link to the program's website, to the staff, that would be appreciated.

MS. MA: Yeah, absolutely.

COMMISSIONER PETERMAN: It was mentioned earlier, the 118 program was mentioned earlier, and we didn't discuss it, but for those who are not familiar, because you were just talking about biofuels, it's $100 million annually for Alternative Fuels Vehicles and Infrastructure, that the Energy Commission manages, and we support a diversity of projects including workforce training. And really, with the 118 Program, it's meant to both incentivize projects, as well as provide the trained staff to do that, and so it's a different model in transportation having renewables. But, to your point, we should be looking at some of these other sectors and some of these connections there as we move ahead in the renewable space. So thank you for your comments.

We have another question here in the audience, or comment in the audience.

MR. MCCANN: Good afternoon, Commissioners. Thank you for the opportunity to speak to you. I'm Richard McCann, I'm with Aspen Environmental Group. I spoke to you last week at the Renewables Cost Workshop, and I just wanted to comment or ask, actually, a question about looking at this in the long-term.

As we know, these models that they're talking about, the JEDI, REMI, E-DRAM, these particular models work quite well in terms of looking at short-term impacts, for example, UC Davis did a study looking at how IMPLAN predicted impacts from the 2006 drought and actually looked at the numbers and it came out very close to actual impacts. But there's a question about moving to long-term modeling effects. As we know, we've had large transformations that have happened in the economy in the past, like the Interstate Highways in the 1950's and the Internet in the last decade that have really changed economic relationships.

And so, I was thinking about this question and looking, on the one hand, that we expect there's going to be increased economic activity in the state from the new green industries, such as renewables; but, on the other hand, we have the rate projections that the utilities presented last week about the increases that are attributable to additional renewables. And we know that

these economic models really aren't very good at capturing economic transformations because they're based on historical relationships, in most cases, that's how the various parameters within the models are developed.

So if the utility projects turn out to be right, and we see these rate increases, how do the panelists envision that we can assess potential economic consequences of these two countervailing effects, given these issues with the models, themselves?

COMMISSIONER PETERMAN: Marshall, do you want to take a stab at that one?

MR. GOLDBERG: Sure. You are exactly right and I didn't get a chance to talk about that, but clearly the JEDI model and other models really relate to the structure of the economy, and it's essentially historic -- in fact, we're typically two years behind because it's all based on government data, the survey data of industries, and all the different relationships of supply chain.

What we're looking at with the JEDI model, to address that, is productivity and an adjustment factor in there, so it would incorporate productivity enhancements. Certainly, there are going to be projections that people will be able to adjust where we're going to look at historical productivity changes in the different sectors

that are used to analyze the impacts in the model. So it's really a good point and we're trying to address that.

COMMISSIONER PETERMAN: Dr. Zabin.

DR. ZABIN: One other point. I mean, it's interesting because we can have rate increases due to more expensive renewables, but at the same time, we have yet to internalize, really, the cost of climate mitigation and carbon, so those two work opposites, and you know, many folks pushing climate change mitigation strategies want a strong price signal and higher energy rates that internalize the cost. So you know, there's that going on, too.

MR. MCCANN: Right, and that's sort of my broader point, is that there's lots of different things that we will see over the next 20 to 30 years in terms of how the economy is going to change, and all these relationships that we're used to are likely to change in ways that we aren't going to capture in computer models, we have to have maybe more of a narrative, I guess, I would say about that. So, thank you.

COMMISSIONER PETERMAN: Thank you for your question and comment. I think we're going to wrap up now. This has been a great conversation, looking forward to hearing more from all of you, particularly to our

panelists, if you have some recommendations for us, again, the output of this workshop and the series will be a list of recommendations for agencies and the Legislature and the Administration, to facilitate us reaching our 2020 goals. So with that, please go spend money in our local economy, go have lunch, we'll be reconvening at 1:45. Thank you.

(Recess at 12:41 p.m.)

(Reconvene at 1:45 p.m.)

MS. GRAILLAT: Okay, my name is Chris Graillat and I'm the Workforce Lead in the Building Standards Implementation Office here at the Commission. I was the Program Manager for the ARRA funded Clean Energy Workforce Training Program, which we did in partnership with the Employment Development Department, the Employment Training Panel, and the California Workforce Investment Board.

This panel will discuss the effectiveness of current training programs and the benefits of coordination with local economic development. Our panel members represent a wide range of workforce stakeholders, from training and education, to employers, to policy development, and non-governmental organizations.

I'm going to just go around and give everyone's name, first, and then each of you will introduce

yourselves and give a three-minute presentation on yourself and your work.

Right next to me, I have John Jaramillo, who is the Dean of Applied Sciences and Business at the College of the Desert, which was a CEWTP Grantee and also works with Partnership Academies on clean energy projects.

We have Javier Romero, who is the Manager of the California Workforce Investment Board, who is a partner on CEWTP, and also a partner with the Energy Commission's Transportation Division on Sector Strategy Plan Development.

John Brauer is the Executive Director of Workforce and Economic Development at the California Labor Federation, which was a CEWTP Training Program.

Nichole Capretz is the Green Energy Good Jobs Campaign Director at the Environmental Health Coalition/California Environmental Justice Alliance, which is a leading Environmental Justice organization.

Susan Wheeler is the Coordinator of Education Relations at Sacramento Metropolitan Utility District, which is an important Energy Upgrade California partner.

Lisa Paulo is Senior Analyst at the California Public Utilities Commission, and she is the Workforce Lead and she also runs the Workforce Education and Training Task Force.

Evgeniya Lindstrom is the Director of the Centers of Excellence at San Bernardino Community College District and the Centers do environmental scans to assess business needs for workforce, so they provided some very important background information to the Energy Commission when we were developing the CEWTP Program.

Raya Zion is the Workforce Development Manager at Solar City, which is a key business partner in the Energy Upgrade California Program.

And now I'm going to go to John Jaramillo and he's going to start us off.

MR. JARAMILLO: Good afternoon, everyone. I am at College of the Desert which is really uniquely positioned in that we're in the heart of so much future development of renewable products, scattered between the Salton Sea and really the High Desert Area.

College of the Desert, through original CEWTP and ARRA funding started developing renewable training programs geared toward both the wind industries and the solar. We took a little different turn than what was originally happening throughout the state in that we really focused on the utility-scale because we felt that that was where the larger number of sustainable jobs were.

So, at College of the Desert we developed the

program with the funding that we had. The challenges that we had to overcome were finding instructors, competing with industry for those experts in the field, and designing a program that could allow individuals who were balancing a lot of different activities in their life and still have access to the education, so we created a program that was primarily in the evenings and on weekends that allowed our faculty to be available after they were done with their traditional jobs, with their real jobs, and yet then they could come over in the afternoons, evenings and weekends and help train our workforce.

The solar utility scale training has been a very successful program primarily because of the close ties we've had to our industry partners who really have provided us with -- really acted as our rudder, keeping us on track, ensuring that we didn't get lost in what we were doing. The program itself, one of the outcomes that we've noticed that has been the leading reason, I think, for a lot of the success in the placement of our students has been, quite honestly, the pre-assessments and the remediation that we did at the beginning.

We did assess anyone who wanted to apply for the program and we evaluated certain skills, mathematics and communication skills. We addressed those in advance

who needed some remediation or some boost up with something a little less than traditional, but a short intense program. And then, from that, we were able to get them through the heavier computational parts of the program, which led to the NABCEP certification, which was really important to the developers who were building the large-scale solar fields to our east.

And because of that, we currently are running just almost 55 to 60 percent of our graduates are employed in the renewable fields, and we actually have a number who have been offered employment and are just waiting for the field of development to begin.

So we're very comfortable, and now we've also been working with our high schools with the Clean Energy Programs and we're creating a pathway program. The high schools now have students in their junior year starting in the fall, so our program -- our credit program, a more traditional academic program, will be ready for them when they graduate in two years. We're going to start teaching some of the classes next year, so we're really excited about the future of sustaining the program.

MR. ROMERO: Hello. My name is Javier Romero. I'm with the California Workforce Investment Board. I am a Section Manager for our Sector Strategy Section in our office. In our office right now, it's an exciting time,

we have a brand new Director, his name is Tim Rainey. Tim Rainey wishes to continue our Sector Strategy approach to workforce development, but he has, how would you say, a targeted emphasis in his approach, and as the Section Manager of the Sector Strategy work, I look forward to being on point on a lot of that work. Right now, we're looking to reconvene the Green Collar Job Council, so we too are benefitting from this discussion today.

And as far as Sector Strategy goes, and the direction Tim envisions, he captured his vision in a recent grant that we submitted to DOL for the Innovation Grant, and central to that Innovation Grant is a new structure, and I say new structure in the sense that it's coming from the State, actually, but it actually has been -- I could say -- piloted at a regional level already, and his structure that he's captured in that Innovation Grant is looking to develop regional skill at a regional level, so that they actually help regionalize the efforts and resources to target the needs of that regional economy, and the needs of those populations.

And central to that strategy is to ensure that we have market-based training programs such as the apprenticeship training programs, ensuring that workforce development efforts have that hard connection to

industry, to ensure that we implement some of the lessons learned that we have from CEWTP, and that's part of my enthusiasm for our work right now, is that we do have a lot of lessons learned and which we pioneered some green work, and the Energy Commission was central to that work, and we could build upon that. And we have done that already, we -- shortly after CEWTP, we submitted a State Energy Sector Partnership Grant in which we grabbed some existing CEWTP Programs and built upon them, and we got to work with them before we actually funded those activities and a common trait on many of them was, on those that perhaps were struggling on their CEWTP site, they self-identified the need to be more industry-driven, a clearer connection to business; when they have a pre-apprenticeship program, have a connection to an actual apprenticeship training program.

And the end result of that is that we want to see actually the alignment of workforce development resources-at-large aligned accordingly. I think it's captured quite well in Career Pathways, that was another central component to our Innovation Grant, and Career Pathways, what it looks like, it's intended to really follow the continuum of the experience of a worker, or a student, if you will.

And workers, a different time, especially in

the hard economic times we find ourselves, become students very quickly. We want the mindset, when they come to the one stop and, in fact, they've been dislocated because of changes to our economy, or they need to have their skills refreshed to become a student, where we actually have community college programs aligned that can actually have that connection to industry that can provide the occupational specific type of training. And that's key to sustainability.

As we all know, we're in an era of diminishing resources, so what that means is we have to become better aligned. If we continue to operate in silos, we're not going to be, how would you say, we're going to have to glamorize our outcomes on our annual reports. But if we wish to address a public need, we're going to have to align our resources, ensure that we're targeted with those resources, that they are connected to jobs, and the only way to be connected to those jobs is actually to be connected with industry and businesses.

Apprenticeship Training Programs is an example of -- kind of an intimate area, if you will -- one of the topics in here was the benefit of connecting to economic development entities, the benefit there is often they already are on the cusp of economic development planning, a connection with industry, working with business

retention strategies. Well, Apprenticeship Training Programs are a part of that mix, too. They're intimately involved, they're partnerships between businesses and labor, actually figuring out how to stay current on the -- how would you say -- the evolving needs of that industry, and so on. So I'll leave that there and hope to be able to expand a little more on Industry Sector Strategies in the context of our questions.

MR. BRAUER: I'm John Brauer, I'm the Executive Director for Workforce and Economic Development at Cal Labor Fed and just started about three weeks ago as Tim's replacement at the Labor Fed.

The Labor Federation represents approximately two million workers in the State of California, including the State Building Construction Trades, which operate joint apprenticeship training programs and, likewise, we are an advocate of those programs, which are State regulated, and the skills and standards attached to them are set by the State.

Likewise, the model that we use is a Joint Apprenticeship Training Council that has employers in the room helping to set those standards, as well as telling them to project what the labor market demand will be out in the future, so if there isn't any training going on, if there isn't going to be any work on a regional and

local level, and I think they're a very good barometer as you move around the state of knowing what's coming up and trying to meet those workforce needs.

I should also say that I, prior to this, for the last 11 years, ran a community-based organization in Oakland that ran a pre-apprenticeship program and was part of an alliance of CVOs that worked with our local building trades to get folks into apprenticeship around construction at the Port of Oakland, so I'm well aware of the barriers and issues around that activity, as well as having partnered with the community colleges in the East Bay, for alignment with them.

So I'll leave it at that for now.

MS. CAPRETZ: My name is Nicole Capretz. I work in San Diego at the Environmental Health Coalition, and I am part of a larger State Alliance called the California Environmental Justice Alliance, we are six grassroots organizations in different geographic regions of California.

And we've been happy to participate in a number of these IEPR panels and, in particular, for Environmental Health Coalition, we are very focused on trying to create that Pathways Out of Poverty dream that was kind of sold to our community members as the green economy started moving forward, and I think at this

point, it's still a distant promise and, while we're still obviously eagerly invested and interested in making sure we can have more fruitful partnerships, it hasn't really materialized, at least on the ground in San Diego, and I think in talking with some of our training programs, and I'm glad everyone has great experience and maybe can help us, as well, with the community colleges and some of our community-based organizations who are doing training, coupled with our workforce investment program trainees, and then, of course, the Union Apprenticeships.

There's a kind of disconnect between all those programs and particularly a disconnect between those training programs and the private sector. I think, in talking to the contractors, one of the biggest barriers is they feel -- first of all, they don't even know about the training programs, so they don't even think to go to those, the graduates of those training programs, to hire. And they aren't helping to develop the curriculum, and so that there -- if any of these -- you know, we try to forge that connection, if any of these trained workers go to those contractors and interview, they often find the skill set doesn't match, that we haven't matched what the contractors need with what they've been trained to do, and I think that's kind of a gap that exists and

hopefully this kind of conversation can help end that gap.

And overall, I just think, you know, it's tough, I think -- I'm happy to hear previous speaker's -- sorry, I don't know your name --

MR. BRAUER: John.

MS. CAPRETZ: -- John -- really discuss the barriers involved with the hard to reach communities because there are a lot of barriers, it's going to take a lot more intention to make that pathway successful, and it's a hard one, but I think we can do it and, again, just want to highlight what we have viewed as a really successful model is the Energy Smart Jobs model that was done by the PECI, Portland Environmental Conservation Institute, or something, through ARRA funding, that really successfully partnered with the private sector with these training programs.

So, anyhow, as we get into more conversation, happy to discuss it, and happy to learn from more people here about how you've successfully navigated this road. Thanks.

MS. WHEELER: Hello. I'm Susan Wheeler and I'm with SMUD, Sacramento Municipal Utility District. In the Workforce Planning, Workforce Development and Organization Development Group at SMUD. And my

responsibilities are education outreach and workforce planning.

For those of you who are not familiar with SMUD, just a couple slides on background. So we provide electricity to both commercial and residential customers, over 700,000 customers combined in the greater Sacramento Region. We are governed by our customers, actually, and also by our Board of Directors, and we've been in business for 65 years. Our service territory covers 900 square miles. The majority of our energy sources come from renewable sources in hydro, so just kind of a little snapshot of who we are.

In terms of what we do in the community as it relates to workforce planning and workforce development, we have a number of programs in place to work jointly with primary, secondary, and post-secondary education partners to help shape the curriculum so that we can avoid the problem that Nicole had indicated, where we have workers who are trained for the jobs that they will need for the future in the energy area.

And we also work closely with our local Workforce Investment Board, we're very active in terms of participating with the programs they have in place, both from our own employee standpoint, as well as helping to support some of the programs they have in the community.

So, anyway, a little bit of background about what we do.

MS. PAULO: Hi, my name is Lisa Paulo and I'm here today representing the California Public Utilities Commission, and I'm going to give you just kind of a high level overview in the last four years how the CPUC has been working to try to support workforce development in the areas of renewables and energy efficiency.

So back in 2008, many of you may already know of the California Energy Efficiency Strategic Plan, that was a roadmap that was developed after extensive workshops, I think there were like 40 workshops that went into that, where we heard from stakeholders among the various sections of energy efficiency and demand side programs that the PUC oversees. So there was a commercial chapter, there was a chapter that focused on residential, and there was, for the first time, a chapter focused on workforce education and training, so in 2008 is when the CPUC first recognized that workforce education, training and development could be a market transformation driver for the State of California, and that was under the leadership of Commissioner Grueneich that the Commission first focused on that.

The utilities had actually been providing training for many years before that, I think going back 20 years, in their network of energy centers throughout

the state; but that was all lumped into what was called Marketing, Education and Outreach, which also included training and education for customers, consumers. This was a first time the Commission actually separated workforce-related training and customer-related education. That was pretty significant.

And then a year later in 2009, the decision that provided guidance on the 2010 through 2012 program cycle, which is the one that we're currently in, and that's coming to a wrap, provided guidance to the utilities, again, for the first time ever on Workforce Education, Training and Strategies that we would like to see the utilities throughout the state, as a unit, market transformation driver, pursue.

And one of those directives was to commission an analysis called the Workforce Education and Training Needs Assessment for California, and you heard from Carol Zabin early this morning, she shared with you some results that came out of that study, so I'm not going to repeat that right now, but within that Needs Assessment -- here is a copy of it right here, it's big, if anybody wants a copy, I can make sure to provide one for you, it's very interesting -- there were a series of recommendations that came out, not just for utilities, it wasn't utility centric, Commissioner Grueneich made it

very clear that she wanted it to be something that anyone could use in California, but there was a chapter anyway, we have to be responsive to our ratepayers that funded this study, specifically geared towards the utilities, in ways that they can promote workforce education and training in the clean energy sectors.

So among the many strategies, one strategy stood out, in particular, and Javier mentioned it, was the Sector Strategy approach to labor development and economic development. And so, in October of last year, 2011, the utilities filed an advice letter which they were directed to do by the same decision that granted or commissioned the study, that utilities within 60 days had to submit an advice letter that demonstrated how they would approach the recommendations in the study.

Since there were a lot of recommendations and a lot of it hinging on increased standards, quality certifications, things like that that we've already heard about this morning, it was a lot to try to address by the time that report was completed, which was March of 2011. So, instead, the utilities' approach was to initiate a Sector Strategy approach, which includes partnerships with many of the organizations that are here, you know, potential partnerships going forward, and then address their other recommendations through that partnership, so

that's what was approved in October.

So the utilities have been working on that. I probably can't say too much until it becomes official, but there are some exciting new partnerships that are being developed and the utilities are actually stepping out of their boundaries that they were in before, which was one of the main objectives of the directives, to not just be doing this in a silo just within the utilities, but to actually reach out and partner with other organizations, like Javier said, to share the resources in this time of limited resources, and really try to get California back on its feet again and hopefully the leader of clean energy and the workforce that can support that.

So now we are going into the '13-'14 transition period, there's been a recent decision in May, actually on the 10th, a couple weeks ago, that identify specific areas like the HVAC industry, that we'd like the utilities to organize a Sector Strategy around, as well as continuing their Advance Lighting Sector Strategy, which was mentioned in the Needs Assessment as a model example for how the utilities actually on their own partnered with the manufacturers of advanced lighting technologies, the trade and labor groups, they got resources from those groups, and they actually came up

with new standards for this new technology that was emerging, and they actually were able to develop a training program to support that technology, so that was very exciting.

So now they're going to continue that going into '13-'14, and are going to start looking at HVAC, among other Sector Strategies. So I just kind of wanted to give you kind of a quick overview in the last four years how the CPUC has been focused on workforce and how the utilities have also now -- hopefully you'll see more presence with these partnerships and things going forward. Thank you.

COMMISSIONER PETERMAN: Before we move on to the next introduction, just a quick follow-up question for Lisa and for Susan. The workforce training programs you're talking about, do they also include training for grid operators?

MS. PAULO: So the training programs that we work on, we consider them the demand side programs, so they're energy efficiency, renewables, there are some Smart Meter, and the Needs Assessment actually focused on Demand Side because we had limited resources, but there's definitely -- I think that naturally we're going to see the supply side issues come into play because they are so intricately linked when you start talking about Smart

Meters and grid development, and EV, and that kind of thing.

MS. WHEELER: And as far as what we're doing at SMUD, we're working closely with SAC State in their Smart Grid Center, as well as with some of the curriculum that they're currently in the process of developing, so around the operations side of things, as well.

COMMISSIONER PETERMAN: Thank you. You know, my question was stimulated by the fact that I've had some conversations recently, just about, you know, the needs again for further integration of renewables and some of the challenges we're having with west-wide coordination, etc., and so as we're thinking about job training related to renewables, specifically. I also want to make sure we're thinking, as well, about training or to integrate the renewables into the system. So I appreciate that clarification.

MS. PAULO: Can I add on to your comments --

COMMISSIONER PETERMAN: Oh, please, go ahead.

MS. PAULO: -- because what you just said made me remember that, in the needs assessment -- I'm sorry, in the Strategic Plan, there's also a chapter that we call IDSM, which is Integrated Demand Side Management, and so for the '10 through '12 cycle, the utilities have been trying to integrate both internally to support

integrated programs that support energy efficiency and renewables, but also to develop an integrated cost effectiveness methodology and an integrated audit tool; there has been limited success in this effort that we've seen in '10 through '12, and so there's extended guidance for the '13-'14 period, but I'm just mentioning it now because, what you just said, that could be a foothold in terms of starting to address the workforce component once the integration effort hopefully gets off to a better pace this next cycle.

COMMISSIONER PETERMAN: Thank you. And I imagine there's also working happening at the ISO, but I thought, in particular, SMUD might have some insight because they have their own control room.

MS. WHEELER: And in addition, just a program that we finished up with U.C. Davis, we had some students doing some practical hands-on work with some of our forecasters to look at how to integrate renewables into our existing base, so trying to address some of the issues that I know we're going to come up here with, which is how do you take the learning and make it real and practical, but this is in a real world instance.

COMMISSIONER PETERMAN: Thank you, I don't want to steal Chris' thunder, I just wanted to ask you two while I had the opportunity. Thanks.

MS. LINDSTROM: Hi, I'm Evgeniya Lindstrom and I represent the Centers of Excellence -- can everyone hear me now? I'm Geniya Lindstrom and I represent the Centers of Excellence of the California Community College System, there are five Regional Centers across California, we're all hosted at local community college districts of colleges. And I represent the Inland Empire and San Diego Imperial Center of Excellence, serving about 22 community colleges.

What we do is we provide the labor market information and workforce research that is customized for community colleges. Our flagship product is Environmental Scan, which is a publicly accessible report, it has two significant parts, on one part we assess the employer needs and challenges that they have in this specific area, usually we focus on an emerging or high growth area, and we survey a representative sample of Employers to be able to understand what their needs are, what their needs are going to be, and what challenges they face.

And on the other side, we also go to our colleges and we try to understand what colleges are offering in that specific area, industry, or occupational area, and what challenges they face, and then we try to understand, okay, so where are the gaps, where are the

mismatches?

So in the last five years, the Centers of Excellence have focused their work on many of the renewable energy and clean energy related areas. In 2008, we've done our first solar study, we looked at eight solar occupations, at that point they were all emerging occupations and none of the Community Colleges except three across the state had programs.

And last year, my colleague Michelle Marquez and I did another study on the solar industry and occupations in California, and now we have 54 community colleges offering some kind of training or course in solar energy, which was really an amazing finding.

So that report is published online and on our website at COECCC.net. It's publicly accessible. It also lists recommendations for community colleges in terms of what they need to do.

I've also been -- I worked on a small part of the Needs Assessment Study that Lisa mentioned and participated in one of the Regional Industry Clusters of Opportunities, groups working with the local WIBs in my area, so I have that perspective, too. We specifically focused on clean transportation for our group there.

MS. ZION: Hi. Good afternoon. My name is Raya Zion and I am the Workforce Development Manager for

Solar City. I started in January. Solar City had the great vision and innovation to bring in a Workforce Development person inside the company, which is a rare thing. In my 10 years of workforce development within the WIB system, and the labor system, I've never met a company in the private sector that had a Workforce Development person.

So my job is within the HR Department and I'm to engage and connect with Veterans organizations, primarily because of our Solar Strong Program, with government agencies, education institutions, and community organizations, to not only develop community relations, but also assist the Recruiting Department to bring in people that are being retrained into the solar and energy efficiency sector.

Also, Solar City, as opposed to some other solar companies, not only do we do installation and energy efficiency audit, but we also have everything in-house where the salespeople are in-house, the finance people are in-house, customer service is in-house, so there's a great opportunity for people to re-train into different tasks that don't just involve construction, although Solar is a construction field, but we have positions for everyone.

And as I mentioned earlier, training is a great

passion of mine because I have worked as a Business Services Representative and as a Job Developer with San Mateo County Workforce Investment Board, the Alameda County Workforce Investment Board, and the San Mateo County Central Labor Council for the last 10 years in helping thousands of dislocated workers get into new careers, so it's really a passion of mine to help as many people enter this sector as possible.

MS. GRAILLAT: Okay, well, thank you all. We appreciate your participation and sharing your perspectives and recommendations for the Energy Commission's future in Workforce for Renewable Energy. And now we're going to grill you with some questions. So we're going to do last in, first in, we're going to start with Raya.

The first question we have is what skills are important to clean energy employers? Are there skills gaps? And if so, how can we address them? And I think you have a good perspective, coming from Solar City.

MS. ZION: Yeah, and actually coming from the Workforce System within the WIBs. It's interesting, when I first started working at Solar City, I've had all these relationships with the Community Colleges that I had worked with as a workforce -- as a WIB representative in that I, myself, was funded by two grants as a Business

Services Representative, I was funded by the Bay Area Clean Energy Careers Grant to do job development before I got into Solar City, as well as the Hero Grant, which is the Home Energy -- whatever Occupation Grant, I forget the -- so I really -- a lot of these students are still circling around and I want to bring them into Solar City, so I met with some of the Managers in Solar City and I said, you know, what is it that is missing? Why can't we employ more people that are coming out of the programs?

And I know, in regards to Solar City, I know that they have participated in curriculum development within those grants, at least for sure with the solar installation, as well as the solar sales class.

From what I understand, and from what I found out, is that there needs to be some sort of a hands-on component to some of these training programs that will make the candidates more marketable to companies. And I agree with Nicole, I mean, that's something that will be coming in, we definitely need to get more commitment from the private sector to employ people that are coming out of those training programs, as well as the education from both parts; not only are companies not aware of the training programs, the training programs are not approaching the companies either, there's a wall between the private sector and the public sector that is not

being met, so I think, as far as the skill gap, I would say more hands-on as in Rising Sun, and I'm sure you guys are aware of the Rising Sun in Berkeley, where they have a year-long tagalong to their energy efficiency program. And thus, that makes the people more marketable. If they're coming in, you know, from a non-construction field, if they're coming from a construction field, then that would be a -- it's easier to transition them into the clean energy fields.

MS. WHEELER: If I can add to that? So I'm going to talk about current challenge in terms of skill gap and future, so an example of current challenge, we have, to add to what Raya was saying, we have an opening, a couple of openings, that are very hard to fill because we're looking for people with experience, and we find that trying to build up the technical background with the actual practical experience, we're having a hard time with that fit. One is a background in Mechanical Engineering, or Professional Engineering, and the other is in Electrical Engineering.

But, you know, we find that the students who come right out of school don't have that practical hands-on experience. So, even to reinforce what we heard this morning with Rhonda, talking more about apprenticeships and internships and being able to put programs like that

in place to give students that capability so that it's not just the book learning, but it's also kind of the practical hands on.

We hosted a Jordanian Delegation recently at SMUD and they have a requirement that their Engineers have to spend a year in a business working before they can get their degree; so we don't have that here, as far as I know.

The future is still a gap -- one of the things that we're seeing a lot of is that, because of Smart Grid, we're going to need a blending of skills, so not just purely engineering and not just purely IT and telecommunications, but we're going to need people who can crossover and have blending of those skill sets.

COMMISSIONER PETERMAN: Just let me ask a quick follow-up question to Susan. As with many agencies and companies, utilities in particular have an aging workforce, and so you'll be having to deal with that attrition issue, nonetheless. And so, in thinking about hands-on experience, you know, I'm just thinking about the model of apprenticeship and whether those currently in the utility sector didn't have the skills that need to be taught to those who are entering, and then just to what extent you thought about that, or whether there's a different model to be thinking now in terms of

apprenticeship because of that challenge.

MS. WHEELER: Well, one of the things that we're working on currently is a knowledge capture, so we're really putting into place the recognition that we have 42 percent of our workforce that can retire within five years, we're trying to put in place the capability to capture that tribal knowledge before it leaves the company and, then, to be able to bring people in through the ranks.

We're also working closely with high schools and with colleges on internship programs. We currently -- we'll have 25 high school interns starting at SMUD this summer and we've had interns, high school interns, throughout the years. We have a college internship program, that part of my job -- I'm relatively new at SMUD, as well -- but part of my job will be to strengthen our college internship programs, as well.

COMMISSIONER PETERMAN: Thank you. And I just think your perspective is important about kind of broadening the conversation about what a clean energy job is, because it's not just with renewable installations, but also with the utilities and the infrastructure that is supported.

MS. WHEELER: And not only that, but also the programs that we put into place to help the companies

that we work with, so our secondary market, I think, was the indirect jobs that Dean referred to.

MS. ZION: If I may just add to that, just basically for any retraining program, from maybe urban communities that are retraining young adults to enter into construction fields, or installation, if there could also be some sort of a computer literacy program attachment to it because a lot of, especially energy efficiency, they have to use a handheld computer like an iPad, and so kind of more familiarity with computer and high tech items because it's not just pounding on walls anymore.

MS. PAULO: And I would -- oh, I'm sorry, go ahead -- okay, I'll just add to the conversation, there's all these great ideas, but one thing, I went to a recent solar tech -- I think I saw you there, Raya -- and I sat in on a workforce panel and there are things that are not high tech-related that are really critical.

And one of the examples was, with the sales force in a solar company, when they go out and they see a 20-year-old roof and yet nothing is said to the homeowner, and it could be a training issue, you know, where they're just not focusing on that, and then a brand new panel is installed, ratepayer dollars are provided, and then within a few years that panel has to be torn

down and the roof has to be replaced, so that's just an example of some costs and something that a training program could hopefully address, and that would lead to more positive feelings from consumers about that technology, about the industry as a whole.

And then the last thing I'll say that came out of that same workshop was, you know, just having roofers and the solar installers communicating and understanding how their work interties with supporting these systems. Apparently there's a huge gap there. And there again, you know, the roofers aren't really the solar installers, like you were saying, Commissioner, but they are intricately involved in the success or failure of that industry.

COMMISSIONER PETERMAN: One just quick follow-up question on this, and I know Chris has more questions, it's for both of you just on this conversation, particularly for Raya in thinking about Solar City, so to that point about having the training to know what to look for, a roof to be repaired, etc., what role, then, do you envision certification bodies potentially, like NABCEP, have in this where, if you hire a NABCEP certified trainer who has more experience and certain book training, then is that sufficient to then train whoever is working with that person? You know, how much needs to

happen in the initial training programs in the community colleges, etc. versus having people with different education base within that team? And maybe you can speak to it, Raya, just in terms of whether or not you do incorporate, say, NABCEP certified installers.

MS. ZION: In my experience, yes; I mean, NABCEP definitely looks great on a resume if somebody has a NABCEP certification, but a lot of the training programs, especially the entry level NABCEP certification, the person does not necessarily have to have experience, so you could just take it and have the entry level.

Now, after, as you know, for the secondary one, they have to have at least, you know, five installations under their belt and usually within a year, or at 15 months, they're able to take the second one, so that's the hard core one. The entry level one, you know, it looks good because even sales people have that, but they usually come in as assistant installers, they wouldn't necessarily be an installer position.

COMMISSIONER PETERMAN: Thank you, and I appreciate those types of certifications also come with their cost, and so I'm not implying that they should be done in lieu of the other training, but it's just good to get a sense of what is already out there and --

MS. ZION: Yeah, a lot of the training programs offer a NABCEP test at the end, so a lot of the people coming out of the installation programs do go in for their entry level NABCEP certification.

MS. GRAILLAT: And I'd like John Jaramillo from the College of the Desert, can you give us a perspective as an organization that's trying to meet the needs of local employers? What did you find they wanted? And what gaps exist?

MR. JARAMILLO: Certainly. We all know that experience, of course, is first and foremost when people are coming for these. One of the things we realized is that many of our participants in the program had very closely related experience, but they didn't know how to put it in a resume. And I know that sounds a little interesting, but they were a generator, repair mechanic for the United States Military for 18 years and went through four levels of training there, but didn't know how to put that on a resume, and really didn't know how to share it.

So something that some people might think of as common sense, many of the people that were in our programs had had single jobs for a very long time, and they hadn't gone through the resume or the job search, or the job interview process, so adding that to our program

has helped quite a bit.

In the program, they actually go through mock interviews and actually in the evolution of the program, the mock interviews have turned into real interviews, so they're actually interviewing as part of the process. So that's one area.

Getting an Applied Nature is an interesting challenge in education, generally. I did hear Susan say, you know, no one is really doing it. The few schools who really have the capability and do it, the two that are probably the most well known are the two Cal Polys. Cal Poly Graduates have about a 90 percent placement rate when they graduate college, which dwarfs traditional colleges and it is because of the Applied Nature of many of their programs.

I'm Dean of Applied Sciences in Business, but what's interesting is Applied Degrees in California at the Community College level are generally not accepted. And Applied degrees are not as common here in California as they are in some states where a degree in Applied Technology or a Degree in HVAC, or Associate of Applied Science is a fairly common degree, where in California it is not. So it is one of the things we're looking at.

Additionally, the connection between the industry, the internships, yes, if there are

opportunities for internships, you always take them, whether it's a job shadowing, or a full on internship.

The other aspect that is really important is what we call externships, and that's getting the faculty from our institutions into the workforce. We've been doing that fairly successfully for about five years now and getting faculty into, whether they're working with architects, or working with the actual renewable energy companies, or the design companies, or even in the sales and accounting departments.

So it goes beyond the people teaching the direct courses, it also goes into having our English and our math instructors and our business instructors participating in these industry-related externships and bringing back that knowledge for discussion, for curriculum revisement, that has been significantly helpful in building the relationships.

And California Community Colleges, if you have a career in the Technical Ed area, you have a program advisory group. The program advisory's help in keeping the industry people involved, there's always a challenge and pretty dynamic business, and people come and go. But those advisory groups have helped with making recommendations primarily on equipment and then very unique partnerships, much like we've had with Glen

Reynolds and Gossamer with equipment. Our equipment that we were training people on was state-of-the art, we were thrilled, it was exciting, the problem is state-of-the-art doesn't stay state-of-the-art very long, while the fundamental principles that we're using with our mirrors on our thermal are still the same exact principles they'll use. The technology is already leapfrogging us with new materials and new things. We know what they are and we are able to integrate some of those, but that is always going to be a challenge if industry isn't really helping us to stay current, it will always be an obstacle, rather than a complement, so….

MS. GRAILLAT: Okay, thanks. We're going to move on to question 2, which is, are workforce training program graduates finding jobs in renewable energy? And Geniya, can you start us off with that? What kind of research are the Centers finding?

MS. LINDSTROM: Sure. And my answer is yes and no. So the "yes" part, it really depends on the training program from when we looked at solar industry and training in that arena, it depends how the program is structured.

What we found when we asked a sample of Community College Administrators of those programs is that over two-thirds of them said that the number one

challenge for them is employment opportunities for their graduates and finding those employment opportunities.

So looking in kind of more depth into that answer, we found that there were several reasons for it, one, there were not -- it turns out there were less jobs than what was expected.

When originally we did our solar research in 2008, like I already mentioned, there were only like a couple community colleges doing training and a few other agencies, I mean, there were like only two entities offering NABCEP certified training.

In 2009 -- I mean, in 2011 -- when we did our study last year, we found that there are 54 Community Colleges, almost all of them offer NABCEP certification, or they prepare for a NABCEP certification. So Community Colleges really adapted really fast and started providing those training programs, so there were really more training than was needed, there was less jobs than what was predicted, so that's one of the reasons.

The other is lots of competition from experienced construction workers who could obtain this additional skill set, so they were competing against many of the training participants who did not necessarily have that construction experience. And what we've heard, and it's the same message that we got from our Employers we

surveyed, is that construction, or some kind of building or trade experience, is an important component for employment.

So all of that really contributed. But programs that focused on incumbent worker training, like in retraining Electricians, they have been doing really well. Those, also, who had strong partnerships with Employers early on when they actually had the Employer on board before starting their training program, those also turned out to be very successful.

The one that we're more focused on, training displaced workers that did not have prerequisites entering that training program, or maybe hard enough prerequisites, we found that they have really dismal results in terms of job placements.

MS. GRAILLAT: Thanks. John Brauer, you are -- the Cal Labor Federation was one of our CEWTP training programs, can you give a perspective on this?

MR. BRAUER: So I wanted to maybe answer the second question first, which are the jobs of the future, and I think you heard this morning, and you're even hearing it now, which is, aside from the professional and the construction sector, is really in the individual crafts involved, is really where a lot of this work is going to go.

I just wanted, again, I was struck having sat here this morning, to reiterate I think what Carol Zabin was saying in terms of apprenticeship needing to be a centerpiece of this, I think it speaks to a number of things, one is the pathway aspect that Javier was talking about, and building on existing skills that an existing workforce, that you saw this morning is seeing unemployment rates of 30 and 40 percent taking an opportunity to get to.

As somebody who has struggled on a local level to get folks into those building trades, I can say that, once you can get folks in that door, that you've really put them in a place over a lifetime to get an income that's going to meet their family and be back into the local economy from a wage and a skilled perspective.

Also, apprenticeship, more so than any other training that goes on in the state, really looks at the local market and what's going on locally, that those entities, because they've got for the most part employers in the room, are looking at what's coming forward and coming in the future. They're also training a large part of this sector of workers already, I think, I was looking at Carol's study last year and for upgrading journey level workers in the trades doing this kind of work, approximately five times as much as even what's gone

through the community college, and that's not to say to choose one over the other, as somebody who sent a lot of folks initially down the education path, that the community colleges are really good gateways for a lot of folks, but figuring out how to create incentives through either the work standards and/or other incentives on the funding to make those partnerships improve in the future, I think, is going to be critical.

But I think we've got, as I think you're hearing, there are both retirements, but also unemployed, and I think we've got a workforce that is also looking for work in this equation, and has a lot of the basic skills that you've also heard.

But this morning, with the Brookings findings and hearing now that they're looking for those folks with the construction experience, and that's not to exclude, in terms of access and equity issues, somebody who comes from Oakland, that's really important to me. But that is the true pathway for folks getting a full range of skills.

The other thing we heard this morning was innovation and I think developing critical thinking skills and getting the training that you get through those apprenticeship programs is one way to keep the state and this industry innovative and be able to respond

to it.

MS. GRAILLAT: Would anyone else like to add their perspective on this question?

MR. JARAMILLO: I guess I can add a little bit more. The challenge of actually finding the jobs, of course, it's a pretty daunting challenge statewide in most areas. Where, again, we've benefitted is particular programs often take a while to develop. Oftentimes with workforce training, the funding is not the regular funding stream for the community colleges, so many of the new programs came from short-term innovative funding through grants. Many colleges have been able to bring it into their primary mission, but if it's still on the outside, many of these grants have a very very short ramp-up time and getting the programs to really match specifically the industry needs is often rushed. And what we found is the programs that don't rush it, or have the ability not to rush that program development where the curriculum is designed by doing proper analysis and working with the future employers, that there is a very tangible benefit. So, oftentimes when the grant comes and it says, you know, you'll have your first class in place in six weeks and you'll be moving forward, if you don't have a curriculum shelf that you're bringing this off of, that is relevant and the challenge again with

that is like my earlier talk, the technology is leapfrogging, so remaining relevant really means you're constantly updating your curriculum, even if you're not doing that training.

MS. ZION: Just from my Alameda County workforce state, I was the Clean Tech Business Rep, so I represented the County with engaging with clean tech sectors. And one of the things, I put together a Clean Tech Advisory Group for the Board, and one of the things that was their concern about the curriculum is that, especially in solar, although we do have the certification, as far as the education for the curriculum, there's no standardization in energy efficiency or in solar training. And I'm not talking about the apprenticeship programs, I'm talking about the community college curriculums, so I don't know whether there's a way to somehow standardize curriculum in that way to be a faster turnaround period.

MR. JARAMILLO: I'm wondering if our Chancellor's Office paid you to ask that comment, but…. Alignment of curriculum across the community colleges is a huge challenge. California community colleges are local entities for the most part, we do have a statewide Chancellor's Office, but it does not drive curriculum. Curriculum is driven at the school and sometimes at the

program and faculty level. There are some examples, I think someone can give better specifics, but in our CIS program statewide, we have something like 2,000 different certificates and degree programs in California, many of which are very similar, but also different. And there is very -- there are many activities right now focused on narrowing that and we've had some success in some other related industries such as early childhood education that has a very standardized curriculum throughout the state. It took several years to get to that point in that program area. There are other technical areas that are doing that. The regionalization of a lot of that curriculum is helping most of the CT Programs belong to a region, and also the community colleges. And so the curriculum is being shared within those regions, but a lot of the development still comes from a single faculty member, at times not always with that particular training. College of the Desert had no energy faculty on board; we had physicists, we had mathematicians, we had HVAC instructors, but there were no true energy. So the curriculum in workforce, you could develop on the outside with industry professionals; academic curriculum is required at our college to be developed by full-time faculty, so developing that type of curriculum is a bit of a challenge, and you have to have a strong connection

with the workforce program and the academic program.

At many community colleges, unlike mine, although I will say that the reduction in community college funding is bringing us closer together, the workforce programs and the academic programs are often in very disconnected silos. Sometimes it's referred to as, you know, "that other thing we do," other times it's referred to, "Oh, we do that." So, it is different, traditional academic programs - so that they're bringing together those -- and even in my region, I'm one of the few Deans who actually does both and it has the nature to do with the rural and size of our school and, you know, eliminations of positions. So now I am doing both. But there is a lot of synergy that does come from better connecting the workforce programs with the academic programs. The academic programs move slower, there's no way around that, at least until the program is in place. Once it's in place, the curriculum can be updated regularly, it's getting the curriculum in place with the subject matter faculty in place who can do it.

MS. PAULO: And I just wanted to add to the job placement question, too, on the other side of the equation from the curricula is the actual linking the graduates to the jobs and, so, in California, you know, we have a network of programs that actually boots on the

ground, you know, in energy efficiency -- solar -- and it's not just utility programs, although that's a big component in California, but it's also local government programs, and so through a Sector Strategy approach, and partnerships, hopefully whatever emerges there, there will be a focus on actually linking those jobs to the people that go through the curricula and the training programs, and hopefully add increased standards, you know, as Carol will tell you, we don't need new training programs, we need to revamp the ones that we have and make sure that they're being responsive to the market and to what's needed out there, instead of training to an empty job, or no job.

COMMISSIONER PETERMAN: I wanted to follow-up on something Mr. Bauer said a while ago, before he just completely goes away, if you don't mind. I wanted to make sure I understood what you're saying and then I have a follow-up question related to it. So, I think you said that there's about five times the amount of training happening by the project developers or companies --

MR. BAUER: Number of graduates. So if you're looking at all the programs related to this piece, there's a comparable number of programs at community colleges and the upgrade that is going on in the apprenticeship system around renewable energies and

energy efficiency, and that system actually has about five times the number of folks actually finishing and completing it. And to be understood, its journey-level workers, or folks working their way towards journey-level work, getting upgraded training. So it's not new folks coming into a community college program, per se.

But all I'm saying, the point I was trying to make was you've got a very robust existing system, in addition to the community college, but it's actually a large number of folks are getting this industry-related training in that system, and mostly it was the fact that it wasn't mentioned at all before Carol did this morning, that I was just making that point.

COMMISSIONER PETERMAN: And I just wanted to clarify to understand what you were talking about -- a formalized system, or if this is each company --

MR. BAUER: A formalized system, so each JATP -- that particular Joint Apprenticeship Training Program, the employers and labor, are creating that upgrade training or certification within that JATP and, again, that's a process then that has to go to DAS and get approved and recognized as part of that process.

COMMISSIONER PETERMAN: Thank you. I was just trying to understand if there were specific skills that each company was training for, regardless, that you

couldn't standardize through an education program or -- but I think you've clarified that it is not standardized.

MR. BAUER: Yeah, they're not through a specific employer, but they are specific to that particular skill, or craft, or work done by employers, a broad range of employers within that craft.

COMMISSIONER PETERMAN: Thank you. Nicole.

MS. CAPRETZ: Well, I just wanted to make a broader observation because I don't have as much on-the-ground technical expertise as everybody at the table, but I think an observation is that, you know, it's been interesting being a participant in these conversations, but not a person who actually implements the work, in that, you know, there's this kind of Union vs. non-Union tension that always exists, and I have to say, I saw both sides, you know, I see the community college pathway, I see the community-based organization pathway, but there's something to the strength and success of the Union apprenticeship pathway that is not matched, it's unparalleled. And I think what they bring to the table in terms of the support system and the years of experience and mastery in the art of bringing someone from, you know, an entry-level position to the journey -- I mean, you know, the whole -- I don't know the whole pathway, but all the different levels they go through.

And I think we kind of tend to not dismiss it, but not give it its due credit, like what that means and people have to go through years of apprenticeship training before they're kind of set free, and I think we've done a disservice to our community members in kind of saying, "Oh, you just take this six-week survey course and then, you know, you'll find a job somewhere." It's kind of this -- it doesn't take much to learn green construction skills, you know, I think we've been a little too loose with that and I just feel, just an observation, that some quality standards are critical as we move forward in these training programs, and I think it's going to be really important for utilities to kind of understand that, too. And that's just kind of a broader observation and I'm not even sure how much the Unions are at the table with these workforce training conversations at the utility -- or with the efficiency -- well, in San Diego, they're doing Public Advisory Groups, and we don't have any Union training programs at the table at all in the stakeholder conversation, and I think that's a mistake.

COMMISSIONER PETERMAN: Well, I have a follow-up to that, then, and what are the limitations to the utility apprenticeship programs? Is it capacity? You know.

MS. CAPRETZ: Well, for me -- Carol is shaking

her head back there, do you want to come to the mic quickly, after -- if anyone else on the panel wants to respond first to the --

MS. CAPRETZ: Okay, yeah, just more learning from their experience, that maybe some of these other organizations are trying to participate don't --

MR. BRAUER: Can I say one thing, too, before Carol goes? You know, most apprenticeship programs in the state also have to have a connection to a community college, there is a relationship with the local educational agency. So I don't want to -- I hope people aren't viewing this as some pitting or -- there's actually a great partnership and I think making that better and more aligned is really important, I just want to say that to people --

COMMISSIONER PETERMAN: In the effort to solve everything by 3:00.

MR. BRAUER: Right.

COMMISSIONER PETERMAN: I just figured we'd cut to the chase, it seems like we need more experience, there's people with experience, what's going on? Carol

MS. ZION: People that go through those programs go through pre-apprenticeship before they go into -- they don't have to be Union, they could be non-Union apprenticeship programs.

MR. JARAMILLO: Correct, or the program themselves work as a pre-apprenticeship program. Our graduates choose to go to the workforce or to go into an apprenticeship program.

COMMISSIONER PETERMAN: Yes, Dr. Zabin.

DR. ZABIN: Well, I think actually most everything has been covered, I just --

COMMISSIONER PETERMAN: You've been referenced a lot, so you might as well come up to the --

DR. ZABIN: So there are Union and non-Union programs, the Unions graduate about 95 percent, and basically I would say that it's because the Union Employers have learned a business model that really depends on a stable, expensive, or well-paid, let's put it not "expensive," but "well-paid" skilled workforce, and the non-Union employers in this state have hesitated to make those kinds of investments in training, and I think, Raya, you pointed out that Solar City, you know, on the residential solar, there's hardly -- your firm is probably the only one with an in-house workforce development person, that's of course not true -- the utilities have them because they're big employers and they're Unionized Employers, and certainly the Employers who participate in Apprenticeship by definition, because they fund it, they fund training, and they hire the

Apprenticeship Coordinator, they do it on a multi-employer basis, which is a much better public policy method to do training on a multi-employer rather than on a single employer because you can share resources that way. The only other thing I wanted to point out, again, is that the partnerships with community colleges can be at the pre-apprenticeship level, at the apprenticeship level, and at the incumbent worker upgrade training, or journey-level upgrade training, whatever terminology you use. So there's plenty of room for alignment and, if the agencies and the folks who determine what the jobs look like would set those standards, then that kind of alignment can happen a lot easier, so just another plug.

MR. JARAMILLO: And a quick -- it is certainly vitally important that you understand what jobs you're training your participants for, you're not going to create a mechanical engineer in a six-week program. So understanding the skills that they need for the jobs that are coming is a challenge. We've, again, had some pretty good success, but it was because we understood that it was the assembly work that we were training workers for at that moment, and knowing that that's good for the next couple years, but after that we're going to have to train them for different phases, and we're already starting to develop that.

MS. ZION: A lot of the certificate programs are much longer than six weeks, just so you know, they could be three to six months.

MR. JARAMILLO: Actually up to a year.

MS. CAPRETZ: Okay, so I'm sorry, I didn't mean to --

MR. BRAUER: No, that's fine.

MS. CAPRETZ: -- press everybody's buttons, but I guess because I see it, okay --

COMMISSIONER PETERMAN: It would be afternoon, it wakes us up, and it's okay.

MS. CAPRETEZ: But, I guess, coming from the community perspective, like I said in the beginning, they do view the green jobs as a distant promise and that they do feel that we have kind of marketed this idea of this Pathway out of Poverty, and it hasn't materialized. And so something is not going, you know, according to plan. And I know one of the factors, and it has nothing to do with anybody here, is that we haven't quite created the demand for some of these jobs yet in a sustainable way, so that's a fact that obviously no one here can wave a magic wand and make that happen, so that's a factor, for sure, undoubtedly, especially on the efficiency side, you know, we're struggling to make Energy Upgrade really kick into gear in a meaningful way. But I just throw it out

there because we're really -- seeing how we're not Union, non-Union, we don't really take sides, necessarily, but I think there is some value to the experience and success of the Union model. I'm not saying it has to be a Union model we replicate, you know, it doesn't have to be Union because I know that's such another buzz word, but there's something to the fact that they bring people in and successfully over time build a career for these people, really well paying career.

COMMISSIONER MCALLISTER: I would just make an observation, and this discussion could actually be happening, and I missed the utility side of things and I apologize for that, but this discussion could be happening apart from any discussion at all of green jobs, right? This is about economic development and, you know, whether it's any kind of, you know, installation, working class, or managerial position in our economy, in general. I mean, the HVAC contractor has been around for a long time, you know, regardless of Energy Upgrade California or anything else, and so I think a lot of these are really social issues, much broader than sort of, again, the particular place for renewables, or energy efficiency, or whatever, so if we crack that nut, we're going to have done a big social service. But what I think a lot of the discussion this morning and seemingly

now is just about creating -- making sure that, if we do define a marketplace, we do expect the marketplace to grow and exist in energy efficiency, renewables, and we've got to have some kind of quality standard, and it's pushing this discussion to the forefront because it's not just about sort of looking around for whoever will take a job at eight bucks an hour, it's actually that worker you put in, now we have a stake in their doing quality work, and so that's a fundamental change from sort of the way the market is operating now, and I think we need to work together to make -- to figure out how to do that sustainably so that people will actually want -- you know, it will be both affordable enough and well-defined enough, that people will actually want to take up these projects, whether they're solar, energy efficiency, or anything else. So, you know, efficiency in solar -- Commissioner Peterman is leading the renewables, I'm going to be working on the energy efficiency, but a lot of these issues are the same across the board here, particularly when we're talking small-scale. So, anyway, sorry, I'll get off my soapbox here, but I just kind of wanted to get that vision out there so that it helps orient a little bit the discussion.

COMMISSIONER PETERMAN: Just to piggyback there, one other statement, something that was mentioned

earlier which is some of the computer literacy skills and interview, resume building skills that will be similar across, and so duly noted. I think this is a space, though, we are seeing more investment in workforce development because of the potential for opportunity. And so, whether the jobs materialize or not, this is the training that's going to be useful for whatever jobs emerge. Chris -- and I recognize that we're at 3:00, but I say, take a good five or 10 more minutes.

MS. GRAILLAT: Okay, good, because we have four more questions. I think we kind of, we did touch on this issue about our existing training programs preparing workers for the jobs of the future, but what necessarily are the jobs for the future? And John Brauer, what is Cal Fed finding? Cal Labor Federation.

MR. BRAUER: Well, I think my answer was what I kind of gave before, which is I think in terms of the construction side of this, which is where our real interest is, so I don't have a whole lot new to add than what I said before.

MS. PAULO: I have something I'd like to say about potential jobs of the future. I mentioned earlier that one of the strategic planning objectives that the PUC has for our demand side programs is to integrate across the different demand side resources, so energy

efficiency, on-site generation, demand response, and previously that kind of work has been done in silos, you know, we have siloed proceedings, siloed funding, siloed programs, siloed training as a result of the siloed programs, so I would say that the job of the future would be multi-faceted among the different energy resources, and that we need to have people in positions that can support that kind of integration so that we can achieve our greenhouse goals objectives, our Zero Net Energy objectives, which is only going to occur if we integrate all the resources, and we need a workforce that can have the skills to know those relationships, not just on the technical side, but on the financing side, on the cost-effectiveness, how does this pencil out, I don't think we have enough of that kind of comprehensive skill set.

MS. GRAILLAT: Great, thanks. I think in the interest of time, we're going to move on to the next question. You know, we had a lot of money pumped into workforce development through ARRA and there were a lot of lessons learned, a lot of great things that came out of this. Javier, what did the Workforce Investment Board find?

MR. ROMERO: Oh, we found that there was a lot of learning going on. Initially, I think we already talked about that there was a lot of maybe unfounded

optimism, it didn't feel that way initially, you know, so we actually may have done more training in certain areas than was needed. Perhaps we put up programs that were on point, but were not connected to actual employers on the other end. And you know, ARRA was a unique situation, it was a time when all this money came down and the pressure was on for us to spend it and get it out, and get things on the ground, so we had to. And we also at that point, I think, we had a parallel of things, as we're funding training, but also at the same time, we were funding some planning.

We had this one project called the Regional Industry Cluster of Opportunity Grant process and we always thought, boy, ideally it would have been a linear process, we would have done some planning, identified the training and, nope, the plane was in flight, we had to build it. And I think the lessons learned, we do have programs on the ground, we have very smart people and capable people, like Tim reminded me today, today I'm here, I'm standing on the shoulders of people that are actually doing the work out there, and they actually have learned those lessons. And we saw it with our State Industry Sector Partnership, they retooled their CEWTP programs and it looks like, you know, we're still in the middle of that grant, but it looks like they're getting

the placement rates higher on this go-round and we told them, you know, upfront -- retool, do the necessary things, we'll take the heat from DOL because they're not seeing the enrollments, you know, and we did, and we are, but they're starting to pay off.

From our RICO process, what we learned, just to give you a little background what that process is, and I'm not advocating that process, I'm advocating a process, it was data driven, it had a structured approach in how to gauge employers, it had joint priority setting which had a priority set with industry people and the partners around the table, and we had a leveraged investment strategy. And from there, we have strategies that AB 118 is funding further, they're actually aspects of those existing strategies they're funding, and they're actually looking for us to create more strategies and more plans. We actually instituted that process in the Central Valley, they did a diagnostic of the whole region, did some employer gauge -- and the Central Valley is an awfully big place -- they had some sub-regions, and they actually have a renewables project in the Central Valley and, through the employment engagement process they said, "We're worried about that, that we're not going to have the workers in place in the future," so they're engaging education, community colleges, but that

was a three-year project, this project is ending in December, and they're only training now. It took a lot of time to get there, so I think we have to accept the fact that we're going to have to invest upfront to ensure the competencies and infrastructures are in place. Unfortunately, the funding streams don't allow for that. Naturally, ARRA provided that opportunity for us. So, if you create that, opportunities where you're building competencies at a regional level, allowing room for that planning engagement priority setting, because we tell them to do that, but we also tell them at the same time, "Where's your enrollments and outcomes?" You know, parallel tracks, and so guess what? They're going to train, then they're going to do some activities to keep us all happy, but -- so I think we have stuff on the ground, we need to build on them, and we also need to invest existing capacity building out there, be it between apprenticeship training programs at community colleges, or our local Workforce Investment Boards, I don't think for the most part there is a difference of objectives, there's just -- they lack the competencies and infrastructure to make that linkage. You know, we don't have that systemically, we need to bring that about. We have it in isolated incidents, let's point to those, build on those, and make those systemic, rather

than isolated incidents.

COMMISSIONER PETERMAN: Mr. Romero, I guess one of the takeaways I have from what you've just said is that the ARRA money helped to develop the Clean Energy Workforce Training infrastructure, and that that takes time, and so I would be interested in hearing from you now or in your follow-up comments, you know, what those types of investments are and kind of how long we'll have them until we have to start again, because you've mentioned that funding cycles end, and so we want to take advantage of that infrastructure. And I imagine there's some time, but at some point, in a couple years if there's not additional funding, then we'll have to start the wheel again, and so that would be useful to know.

MR. ROMERO: Well, our State Energy Sector Partnership, that's six regions, one in the Central Valley, that's ending January, this coming year. Our RICO has ended, but we required some sustainability and they have gone and gotten additional funding, because of need to further that segment of the economy, they went out and got grants to address permitting, for example. And why we're engaged in that? Because, in order to ensure that our training actually has jobs at the end, we want to make that kind of focus -- and that's not to say our local Workforce Investment Boards are doing all that,

they actually are working with broad regional partnerships and collaborations that have coordinated that kind of strategy and plan. So, to be frank, a lot of that has ended, they're piecing together activities, the SESP is ending December, AB 118, we're going to launch a RICO specific AB 118 effort, that's probably going to be funded in early fall, or actually, let's say roll out in early fall, September or so, that will have 18 months or so lifecycle, so we could see, you know, further see if it gets the kind of outcomes we've seen thus far. And so I think that addresses also your question about PUC and the CEC, what they can do going forward. I'll attribute my response to that, as well.

MS. ZION: If I may add to the ARRA funding question, I was a Job Developer placing people that were coming out of the training, and the ARRA funding helped me in that some of those funds were used for on-the-job training dollars to give back to employers to employ the people from training, so we can't just look at just training/training, we have to look at the whole picture of how industry can be engaged and get incentives, not only for people getting incentives or having solar or energy efficiency, but also for employing the people.

COMMISSIONER PETERMAN: I just want to interject here, and you'll have a minute in a second to

say, considering the time, Chris, I'm going to suggest we wrap up with that and we allow each panelist to offer any final comment; in particular, any recommendation you have for us. Just as a reminder, we're doing this workshop as a part of seven in order to develop some detailed recommendations as a follow-up to our Renewables Report, and strategies to reach some of our 2020 goals, in particular, and so welcome your suggestions for incorporation into that. So we'll get the first sense from you now, including Chris, whatever recommendations you have for us. You can find those later.

MS. GRAILLAT: I'm still processing. Okay, why don't we quickly go around the table, so our last two questions are kind of rolled into one, so what would be a good recommendation? What do you want to leave us with?

MR. JARAMILLO: Kind of a very quick summation. Skilled technicians are made, they're not born. I think one of the greatest benefits that came out of ARRA, actually, and the whole -- I don't want to use "hype," but hype of green jobs, is that it allowed the technician jobs, those technical, heavy technical skilled jobs, to gain recognition as viable career opportunities, down at the lower levels. When you go to the counselor level at the high schools and the middle schools, and they're talking about welding and they're talking about jobs,

careers as technicians, as opposed to everyone is going to college, but everyone is going to college with a purpose. That benefit, I think, will pay very big dividends, we may not see it for a few more years, but as our students are moving out of the schools, you're going to see a change in that perspective and I think it will be very beneficial long-term.

MR. ROMERO: Yeah, I think Energy Commission has been a catalyst during the ARRA, the Green Collar Job Council, they got that going, I would encourage that you continue to do that because the lessons learned from there are being applied more broadly. What I learned through our experience on CEWTP and so on, I'm now applying that and I work with the Health Council. So I would encourage you to build upon the lessons learned, invest in capacity building, and I mean capacity building, invest in how to better work with industry, help to better ensure that we're taking advantage of the expertise and systems out there such as the Apprenticeship Training Programs, and continue to be a catalyst to bring Departments to move out of their silos and think across discipline, across systems, and so on. So I would encourage you to continue that.

MR. BRAUER: I would just reiterate what I think you've heard a couple times today around working on

raising the standards for the quality of the work, itself, meaning the employers and those that are going to undertake the work, and I think from there, then you've heard a number of different ideas around the workforce side, and having a workforce that can meet the needs for being innovative and moving forward.

Workforce development, let me just say as somebody who spent the last 11 years, particularly working in low income communities, where folks have not been -- the general demand for labor does not guarantee them work, that folks face a skills gap and a wage gap in their community, and you have a number of different partners who ultimately have to do the hard work with job seekers to get them the employability skills, the basic educational skills, and the technical skills to move up into a place where, in Oakland, a single adult needs to earn $11.75 an hour, an adult with two kids has to earn somewhere in the neighborhood of $17.50 an hour, and you just don't get there from the general demand, it's both a combination of learning some skills and other factors that can get them to those higher wage jobs. She's gone.

MS. GRAILLAT: We lost her.

MR. BRAUER: We lost her, you're next.

MS. WHEELER: Oh, I'm sorry. I would say to encourage more career academies, work-based learning, and

co-op programs in the community, which would not only create a workforce that is qualified in the kind of green clean economy, but also consumers who understand the importance of renewables and the importance of -- I sometimes forget words -- energy efficiency, there we go, as well. So, yeah, I think those are important factors on both sides, as well as create an understanding for those organizations that receive things like ARRA funds, of how to turn them into sustainable funds; so, in working with one of our local community colleges, I was heartened to hear them say they were going to take the funds that they had used to reduce their energy bill and plough that back into training their students to learn how to continue to do that, rather than to come back and ask for more funds, so they were going to use that as kind of seed investment. So, kind of instilling that, and kind of you've got this ongoing funding model.

MS. PAULO: So I have a couple of suggestions for the CEC to consider. I know that you guys are definitely involved in Codes and Standards and Title 24, and improving increased standards in those areas, so I'm not sure if that could be translated to the workforce, I don't know, maybe the CEC could consider or explore if it's doable to actually become part of a sector strategy, itself, and maybe partner with other state agencies that

are involved in actually developing the training and also promote standards and certifications, along with you in partnership, to address those things. And I would just add that, you know if there's more exploration in that area, you know, one thing that we're struggling with at the PUC, and it was in the last Decision, was that we need to start collecting data and developing methodologies for actually trying to measure the benefits of increased standards and certifications. I mean, it seems very logical and without question, but we need to get the data so that we can make a case, you know, that can be quantified that, yes, it is worth expending these resources in increased training, in higher standards and certifications, and it may cost the program more, but you know, in the end we get more energy efficiency or we get more generation. That hasn't yet been quantified, so that's something that I think in the next two years, we're going to -- hopefully the utilities will step up and try to quantify some of those things that they were directed to do in terms of promoting higher standards, etc., in HVAC.

And then the last thing I'll say is, you know, in the Needs Assessment, it made it clear that, you know, there are a lot of displaced construction workers out there today, and a lot of what we call green jobs really

are kind of overlays on traditional jobs, and so we need to keep that perspective that, you know, if we want green existing traditional jobs, that's probably the way to go, and then hopefully get these displaced workers back to work.

MS. LINDSTROM: The one I wanted to comment on ARRA funding, in talking to many training providers on the community college landscape, we found that they also, in addition to what's been said, they also gain the better understanding of what their local area really needed. So, for example, the program that was done in San Bernardino Community College District was focused on training displaced workers and was focusing more on the energy auditing, and after a year of training and really struggling with job placements, they revamped the program for the following year, they've introduced a PV training to train contractors, so incumbent worker training, and it really worked out much better for them, they had much better outcomes in the end. So the funding helped them build the infrastructure and also understand really what the region needed, so kind of lessons learned.

In terms of some of the takeaways, for me, there is a big push in our system on the statewide level to focus on skill panels, on regional level, and that's going to be -- so our new leadership, Vice Chancellor for

Workforce and Economic Development, Van Ton-Quinlivan, she is recommending and kind of creating the strategy for regions and colleges to bring together employers, labor, community organizations, to talk about specific sectors and she calls them "Skill Panels." So that's going to be really upcoming in the community college system, and some we already have examples in the Bay Area, for example, they've organized themselves that way around energy. And many of the conversations have been around Smart Grid implementation, for example. So that's something to really look into and that's happening the community college system, but other players can be at the table, too.

Some of the successful components that we found from our research of the programs were that close connection to employers, employer partnerships, and that's not just in energy, but across other areas, and having that early connection is important. And there are different models, so there are apprenticeship models, the Union, there are non-Union apprenticeship models, there are kind of like industry advisory that actually are employer-led partnerships, and they drive the training. More regional coordination between programs to avoid duplication and align programs, that is an important direction.

In recommendation, that it's not just about short-term training, but kind of creating some kind of sustainability component for community colleges, maybe implementing or using those labs that have built on the curriculum side, and start to implement new and emerging components in existing curricula.

MS. ZION: What she said. No. Okay, very short statement. We're not working in a bubble here. Training programs aren't alone, industry is not alone, we have to have a way of giving incentives for industry -- well, knowledge to industry about the training programs and engage industry more. I mean, I think this is a great panel, but it would have been nice to have another company here, as well. So I think a lot of panels that I participate in, I like to be in the panels, but we should have more companies engaged because they need to know what's going on, as well, because there is a lack of knowledge in the private sector, as well. So just basically, we're not operating in a panel, we need to have more incentives to help the industry grow as an industry, itself, as well as employers; and just more industry engagement so they would hire more people from all these great programs.

COMMISSIONER PETERMAN: Thank you very much for all your comments. Our next panel is going to have a lot

of companies on it, it's always kind of difficult to figure out how to divide, but thank you for representing on this panel.

Thank you, Chris, for your moderation. This has been an excellent panel, I wish I could listen to you all day, but there are about seven other people ready to share their knowledge, so let's do that changeover. Thank you very much.

MS. GRAILLAT: I just want to remind you all, if you'd like to provide written comments for our record, they're more than welcome, and you can always call me, too.

MS. GREEN: All right, our third and final panel for the day is on Local Economic Development with Renewable Energy with Larry Rillera as our Moderator.

CHAIRMAN WEISENMILLER: Okay, you ready?

MR. RILLERA: Good afternoon, everyone. My name is Larry Rillera. I'm with the Energy Commission staff, and I will be moderating Panel 3, Local Economic Development with Renewable Energy. And what we'll do is go around the table very quickly, introduce you, and I think we'll start with Mark.

MR. THOLKE: How long do you want the introduction? Do you want the full -- the abbreviated or the long one?

MR. RILLERA: Abbreviated, one to two to three minutes, and there will be a signal for --

MR. THOLKE: Okay, so my name is Mark Tholke. I'm the Vice President for enXco, Southwest Region, which means that I'm responsible and accountable for a wind and solar program in California and four other Southwest states. enXco just completed a 100 megawatt Shiloh 3 Project in 2011 and 100 megawatts approximately, I don't know, 60,000 houses, depending on how you measure. And we're in construction right now on a 100 megawatt project, Shiloh 4 in Solano County, a 140 megawatt wind project called Pacific Wind in Kern County, and a 144 megawatt solar project in Kern County. So the first message I want to sort of convey is that the policy support from the State of California is working right now for these renewable energy projects, and thus the renewable energy jobs, and we can go into those jobs in a moment.

Along the lines of introduction for enXco, so I've got 35 people out of my office and we're basically -- most of the people in my office are refugees from the housing -- collapsed housing market, we got a lot of land sales folks and title people in our office, and we go out -- for example, this Pacific Wind project has 230 landowners, each of which has to have a full set of

documents so we can put a wind project on top of their property. enXco has 200 people in our San Diego office and another 200 operation, we have about 400 people in the State of California, and that's not including dozens and dozens of attorneys and environmental surveyors and people who do the development work that has to be put in place before the construction jobs start. And I think I'm going to keep it at that for the intro.

MR. RILLERA: Okay, thank you, Mark. How about we start here with Ben?

MR. FOSTER: Thanks. And I appreciate the leadership that's being shown by the California Energy Commission and the whole group here because this is an exciting opportunity to bring all the key parties together. Ben Foster, I'm a Board member for a Joint Venture, Silicon Valley Network, from the private sector, it's a really great partnership between public and private sector members. From the private sector, I represent Optony, Senior Vice President, and we provide independent technical expertise across the lifecycle of solar systems, primarily focused on buyers which, in large part, have been municipal agencies, State and Federal, as well as investors and some commercial entities.

So our projects include everything from working

with the U.S. EPA, Department of Energy, also, of course, with the State here under the CSI Program, on the localities level, and also on a regional level, so it's exciting for us to be able to bring the knowledge we have on the ground from the Buyer's perspective.

And one of the things I'd like to share just as maybe a carryover from the prior conversations, I don't think we had enough time for public comment, was that one of the key things we saw as successful from the ARRA fund program, from a high leverage perspective, was that wherever you find a lot of exciting solar or other renewable energy projects going on at a local level, if you drill down deep enough, there's always some sort of Sustainability Coordinator, and many of those, or someone with that responsibility, were actually funded through the ARRA program. And so, having that expertise, or the knowledge and the comfort and the training, and the workforce development aspects within the local agencies in a local level and municipalities, is really a key to success to move the market forward. So I wanted to share that and then we'll answer some of the questions.

MR. RILLERA: Thank you, Ben. Glenn.

MR. REYNOLDS: I'm Glenn Reynolds and it's my pleasure to be here representing Gossamer Innovations. And Gossamer specializes in the innovation, development

and commercialization of Concentrated Solar Power technologies, so it's not PV and it's not wind, it's the other flavor of renewable energy, Concentrated Solar Power. Our first generation CSP, trough, we do trough, has wide commercial deployment. We did the first CSP plant, Nevada Solar One, in the 17 years prior to that, that's a 68 megawatt standalone power plant. We also did the power plant for Florida Power and Light in Martin County, it's an integrated solar combined cycle. We've done four Spanish projects and those are all standalone power plants, so we've actually exported American technology, our own technology, California technology, to Europe. And we're in the process of doing that in different places in the world right now.

Just like John Jaramillo said, College of the Desert, that technology doesn't stand still and, so, we knew that we -- we had crafted a technology pathway and it's going to take us to grid parity. Our second generation, that was kind of like our tipping point that told us that we could get there. We have a third and a fourth generation and we're moving in that direction very quickly. Second generation, though, we are getting deployment, we are doing demonstration platforms, we have one going up right now for the University of Lafayette, and that's in Crawley, Louisiana. But the second

generation really is the first commercially available high performance trough, and when you combine the efficiency improvements and the cost reductions, it results in a combined benefit of about 35 percent. This is really really critical in moving renewable energy generation, renewable energy generation to that point of good parity.

So we knew that we had a bridge to go forward and that, on the pathway, we would find ourselves at pricing that is comparative to conventional sources of fuel. However, we're extremely small. If you take away the three founders, I'm one of the founders, there are probably seven others, seven employees, and just about all of those are on a lay-off status.

But when it comes to creating green jobs, really, for us it's projects -- projects, projects, projects. What we do, we're an innovator, we're a technology provider, and we create these designs and then we qualify local suppliers, local to the project, to execute those designs. California has at least a dozen extruders, we use extruders, our support frames -- the collector frames -- are made out of extruded aluminum, we vertically integrate this production at the extruder, and we give the extruder drawings, and out goes the product to the job site.

Similarly, we have our own tracker, it's a two axis tracker, it's the most accurate tracker in the world, and that is made by local steel fabricators, so we can take this whole design for a solar field and localize production to the project. So when I look at California, you know, my gosh, we've got the Mojave Desert, you know? Arizona has a little piece of it, Nevada has a little piece of it, but California has the lion's share of the Mojave Desert, that's the best real estate for solar, just about in the world. And so, it's like that's very very important, it's like California's manifest destiny to do solar, and it's so important to see that and to be able to execute and go get those projects, so, for us, the big message is, you know, we need projects in California, projects in California are going to bring green jobs to California. And before I get overly passionate, I'm going to pass the microphone.

MR. RILLERA: Thank you, Glenn. Lew?

MR. MILFORD: Hi, my name is Lewis Milford. Thanks for the opportunity to be here. I found and manage two nonprofits, one is Clean Energy Group, and the other is Clean Energy States Alliance, and I'm fortunate to have the California Energy Commission a member. CESA is an organization of about 20 states that have, like California does, public funding agencies and we work with

all of them around the U.S. that provide State funding for projects, thousands of them around the country.

I think I'm here to really talk about what some lessons may be from other states for California to consider, it's usually the other way around, of course, everybody is following California, but in some examples there may be some opportunities for California to see what some other states have done, particularly in the economic development area, and I'm going to probably touch on three or four later.

The first has to do with supply chains, and in many of the states, State funded supported analysis of clean energy supply chains is really becoming a common State policy, identifying what supply chains exist, where the gaps are, what kind of support can be made to fill those gaps through targeted State and decentralized policy. So I'll just make that point, but it's very common for States to take the lead on this and not rely on others to do it.

Secondly, much the same thing in terms of identifying clean energy jobs. There was a lot of discussion earlier this morning about different modeling exercises to identify projected jobs from projects, impacts of projects. Some states like Massachusetts have kind of cut the cord and said, "Well, let's actually find

out what jobs we have today." And so Massachusetts actually has done a study identifying about 65,000 jobs in the clean energy sector, efficiency and renewables, that the State paid for, funded, and did within the course of about a year. And it's been a very important, you know, analytical tool, but as important a political tool because, then it becomes much easier to do the policy work you need to do if you can demonstrate that you actually have the workforce behind you, and it's not a model, it's not a projection, these are a real identification of real jobs today. And I'll touch on a couple of other about disadvantaged communities using -- and this is getting a little more attention in the state, Community Development Finance Institutions, CDFIs, which are many places, all over the country, urban and rural areas, I think a vastly under-utilized financing source, they are interested in doing more clean energy work in different areas and could be used more effectively. And lastly, bonding authorities, another area where there's a tremendous opportunity to take capital from that space. So I'll stop there.

MR. RILLERA: Great, thank you, Lew. Melinda.

MS. BROWN: I'm Melinda Brown, I'm with Kern Economic Development Corporation. Glenn, thanks for the marketing ad, Mojave is in Kern County. Anyway, we're

the economic development arm for Kern County, we represent the entire county based on their economic development strategy. Our main goal is business recruitment for jobs, to create jobs for the economic growth and renewables is one of them. We also have a business retention and expansion program for our existing businesses, which comes into play, we do business resources such as workforce financial services, site selection, whatever their needs might be, so we're like their resource center.

Our recruitments have changed just a little bit in the renewables. Kern County has been very successful with the renewable projects and so our focus now is on the supplier end, trying to support the existing projects with that and the supply chain, so we've been successful, so successful -- Mark can attest to that, he's got three projects in our county -- and currently we have 2,800 megawatts currently approved for wind projects, and we have 1,830 megawatts approved for solar projects with 905 megawatts in big application process for wind right now, and 2,100 in the application process for solar. So we're extremely grateful and happy to see this going on and we will talk a little bit more about some of the opportunities for job growth.

] MR. RILLERA: Great, thank you, Melinda.

Dorothy.

MS. KORBER: Hi. I'm Dorothy Korber, I'm a consultant with the California Senate Office of Oversight and Outcomes. And last fall, Kip Lipper of Pro Tem Darrell Steinberg's staff, his Energy expert, came to us, and we're basically an office of former newspaper reporters now working for the Senate, and he asked us to take a look at, in the wake of the Solendra collapse, at the green incentive programs in California, how effective are they. And is there a way to build in protections to head off another Solendra? And is there a way to bring manufacturing jobs to California? We have brilliant scientists and engineers, you know, creating, inventing things, we've got this giant market, how do we get those jobs in the middle, those really good jobs? So this is the report, *Finding the Sweet Spot: Green Energy Incentives in Job Creation*. My colleague, Nancy Vogel, talked to Lew, he's quoted in here, and I'm just happy to add kind of a general perspective on our findings and as we move ahead to questions.

MR. RILLERA: Great, thank you, Dorothy. Kim.

MS. CARR: Okay. Good afternoon. My name is Kim Carr. I'm with the Sierra Nevada Conservancy. And we're a small State agency, we're located within the Natural Resources Agency, there are about 10

conservancies around the state. And our responsibility is to develop and implement sustainability programs, opportunities across the Sierra Nevada, so essentially in rural communities. And what we have been focusing on in the last few years is the forest sector. We have a very high fire risk, our forests are overloaded with fuels in the form of forest biomass, and so we're seeing that, in these rural communities where there's so little economic development and job creation opportunity, and at this point they're living among a forest that's going to burn, it's just a matter of time, there's an opportunity in front of us where we could put those two pieces together with biomass energy.

And so our focus has been really building different collaboratives, getting agreement on how to manage the forests, and then looking for those opportunities to sustain the infrastructure that currently exists primarily in timber mills with co-generation production, but then also in areas where there's no infrastructure and really no place to put the biomass to use it for biomass to energy.

The current common practice is to pile the materials and burn, so complete lost opportunity for energy generation, also job opportunities, but then also there's so many environmental impacts to that, so we're

really needing to shift out of that.

We are seeing that there are job opportunities on both sides of the equation, one is in the woods, it's a lot of mechanical hand crews cutting and basically collecting and transporting the materials, and then, on the other side, through use, biomass energy, small-scale manufacturing, etc. The vision is really distributed community-scaled facilities located in the highest fire risk areas, and providing local energy, but then also being able to transmit that to urban areas.

MR. RILLERA: Okay, thank you, Kim. I think we will shift into the questions. Listening to everybody's introductory remarks might put a little bit of spin on the questions, but I'll give you some time to breathe and adjust to the new paradigm.

MR. GALLEGOS: Hello? This is Bill Gallegos. Do you want me to jump in?

MR. RILLERA: Yes, Bill. I'm sorry, we'll go to the phone now, Bill Gallegos, please.

COMMISSIONER PETERMAN: Hi, Bill. Welcome.

MR. GALLEGOS: Thank you so much, Commissioner. My name is Bill Gallegos. I'm the Executive Director of Communities for a Better Environment, and we're a statewide Environmental Justice organization that works in low-income, African American and Latino communities in

Oakland, in Contra Costa County, in the Harbor Area of Los Angeles, and in the Southeast County Area of Southgate, Walnut Park, and Huntington Park. And for more than 30 years, we've worked to help the residents of these communities address the significant pollution burden that they all suffer, and primarily the impacts of the fossil fuel energy infrastructure that California has, the largest in the country.

And we're really gratified that now we have an opportunity to work with our communities for something more affirmative, for something more positive, and that is the build-out of a clean energy infrastructure.

And our primary concern is that, as we're building out this infrastructure, and as we're developing the policies for this, that California becomes the gold standard for valuing equity as a central criterion in creating our policies. And that means, for us, that the communities which have suffered the worst health, environmental, and other impacts from the fossil fuel infrastructure, get significant benefits from this new infrastructure as we build it out. This means business opportunities, educational opportunities, particularly job opportunities. And we think for this to happen, particularly for inner city and poor rural communities, you need to have policies that allow for local solar

energy development, in particular, that our folks can really get not only the health and the environmental benefits, but the economic benefits of this infrastructure. And that's what I'm hoping -- and I know that it has been a part of the discussion today, and that I'd like to emphasize here, is the importance of equity in our system of values in creating this infrastructure, and I know, as we get on into this discussion, we can talk very specifically about how that can be reflected in policies that would ensure that the benefits of this new energy grid get into the communities that have gotten the worst of the old system.

COMMISSIONER PETERMAN: Thanks, Bill.

MR. GALLEGOS: Thank you so much.

MR. RILLERA: Okay, great. We will launch into the questions. So the first question, what are California's competitive advantages and disadvantages in the creation of permanent jobs related to renewable energy development? And I'll just open it up to any of the panelists here.

MR. THOLKE: I'll start. In terms of competitive advantage, policy stability in California cannot be understated. The demand that is created by the RPS, we really need to underscore that because -- I can give you an example across the United States, we're going

to see the same thing in California, I would anticipate, to the extent we can keep the policy regime stable -- the United States in 2005, the amount of -- I'm talking about wind turbines -- the value of the average wind turbine that was manufactured in the United States in 2005 was 25 percent. Last year, it was 61 percent, manufactured in the United States. And the reason why that is, is because there's been an investment in the manufacturing capabilities to supply the demand that's been generated through policy support such as the Production Tax credit, as well as the Renewable Portfolio Standards that have been proliferating around the United States, California is the strongest Renewable Portfolio Standard.

I can give you a specific example in California, our Shiloh 3 project. Our towers came from overseas, all 50 of the towers, each of the turbines is two megawatts; Shiloh 4, 27 of the 50 towers were manufactured by Ameren, which is in Rancho Cucamonga, a tower manufacturer in California.

There's a PTC cliff at the end of this year, which means the Production Tax Credit that the wind industry relies upon is set to expire and a lot of people are assuming, including me, that it will be renewed, but as we switch into disadvantages, a company like Ameren, and I'm not going to speak for them, but, you know,

companies that are having trouble -- companies that would have trouble bridging the gap, that policy instability will kill them.

And in California, we actually do have a hint of policy instability, believe it or not, with the RPS pyramid, we don't build a project unless the IOUs are purchasing our power and, right now, they're basically full up to 2016, so while I've got three projects in construction right now, one solar and two wind, you know, the next three years look a little thin. So that's a disadvantage with regard to California. Go ahead.

COMMISSIONER PETERMAN: Just a quick follow-up question there. What's the construction time for a wind facility, just with the expectation that we do have these targets later in the RPS period, and so that at some point we anticipate there will be more demand, I was just wondering if that type of uncertainty and sort of timing.

MR. THOLKE: The construction cycle is nine months. The development cycle is three and a half years, so for us to be building this project this year, we've been working on this for three and a half years by the time we get the land and the permit and all that.

MR. FOSTER: Thanks. I've had a chance to think about some of the advantages that we have here compared to the other states, as we've had the

opportunity to work in about 10 or 12 different states around the U.S., as well as globally in China and others for deployment and basically creating at that nexus of where the projects happen and why they happen. Certainly I want to echo Mark's point which is that the leadership that is being shown here, the consistent leadership, as well as those aggressive goals, really give California an advantage, which is why we're the largest deployed base from a solar perspective, as well as many other renewables. So that's a strength because it means that deployed base gives us a really good insight into what's happening and right now, as the market looks to securitize more of these projects, especially on the residential scale, having that access to that base of knowledge about what's really going on, what performance looks like, giving the stability to and the confidence to investors and the financial community has been really important.

I think another area is certainly innovation and the new technologies, you know, somebody said the "S" word over there, so Solendra is certainly an example of where something didn't work out as well, but that new innovation that's constantly happening, based in Silicon Valley, obviously, that there's a lot going on there, but even in some of the newer areas of the monitoring,

maintenance, data layers that are increasingly important, the folks that were here from NREL earlier, I'm sure, could echo the importance of the data, and the fact that we've got that sort of infrastructure here and the ability to understand what's happening.

And then the third area, just to mention, is our connection to the global community, as well as national, I think, if we consider that we can actually export projects and expertise and products from California to the rest of the country, and to the rest of the nation, I think one of the things earlier that struck me is on the fact that all of the job metrics that we're looking at so far are only for projects that are being deployed here in the state, and so, what I haven't seen quantified yet is how much of out-of-state work is being supported by, or provided by manufacturers, service providers, value added expertise, the work that you guys are doing and others around the country, around the world, is actually originating here in California. And so I think that's a key opportunity that we haven't even quantified yet.

Obviously, individual companies are, like ours and many others, are exporting, so to speak, from California, their expertise. But I think, then to move to disadvantaged -- I'll call it "challenges" instead --

is that ultimately there are a lot of efforts going on, Kern County is a great example, you guys are doing great work down there to recruit companies, presumably you're not trying to cherry pick from other regions around the state, but maybe around the country is okay, we might say, but I think there's lots of that kind of innovation happening, whether it's in Contra Costa County with the Diablo Innovation Alliance, whether it's in Silicon Valley, whether it's down in the San Diego Area, I mean, there's just a whole number of regional efforts to try and capture those jobs and incent companies. And at the state level, obviously we heard from GO-Biz earlier, that they're trying at a state level to encourage, which I think makes sense and more coordination, so I think their challenge right now is everyone is trying to pull and find the best opportunities for their own region, but in a little more coordinated effort.

And then one of the things that I wanted to mention here just as an overall challenge, especially when it comes to the job creation, is that the SunShot Goals, the Department of Energy SunShot goals, are specifically targeted in the solar arena at dramatically decreasing what's called the balance of system costs, so those soft costs which include labor, include permitting, and process costs, by 75 percent or so, roughly in the

next four to five years. So when we're talking about jobs, there's a big push from a technology perspective to decrease the amount of labor that's required to put these systems in, to thereby decrease the installed cost of the systems, themselves.

So while we're trying to look at those jobs overall and the economic benefit, we need to look forward five year, 10 years, to where less labor is maybe required, but hopefully the market will continue to grow fast enough to where the total number of jobs will increase. But I think it's important on a unit basis, per megawatt installed, that although there may be in the range of six to 12 jobs or something per megawatt of solar installed, that ultimately that's going to shrink if the DOE and the rest of the industry achieves its goals.

MS. BROWN: I'm going to make it more simple, more on economic development side. And I'm going to refer to Kern County on most of it. But the advantage is the resources that we have, you know, the reason these projects are coming to Kern County is because we have the available land, we have the sunshine 300 days a year, we have the wind, obviously with Tehachapi being the largest wind power provider now in the nation, proves that that's a great place to go and, really, to touch base on what

you said, Ben, we do recruit businesses from all over, but the ones that are looking from California, our goal is to keep them in California, so if they're looking at Kern, it's because they're either looking out of California and they need to expand, and we're trying to keep them here, so we tried to make that point that we're not trying to steal them from you.

But those are -- and we have oil -- Kern County has a little bit of oil, well, a lot of oil, actually, and so they have their own natural resources that they use for renewables. So we have the resources there, that's the attraction for the area, and I think there's obviously other places in California that have the same.

Some of the disadvantages, this is a little bit off of what Ben had said, we need a long-term strategy. Even though we love our construction jobs, they're technically temporary, you know, three to four years. We really need to figure out how we can have long-term permanent jobs and, really, the way we need to do that is basically what Dorothy said, we need some manufacturing and R&D here, we need to make that attractive for people to want to do the business here to support the existing industries.

And that is a definitely hard project to do because of the cost of California, which is the

perception of everybody. I have a tough job because I'm trying to tell them that's not the case, but we do okay with that. Some of the regulations, the time and costs that it takes to get some projects through, we lose them. And those could be job generators, as well. Not that the regulations aren't needed, but the time that it takes on some of them, I'll use CEQA as an example, two years, it's too long, you know, we lose them. So those are just some of the challenges that we face for job creation, and I think if we could get some manufacturing interest back, it would certainly help us.

COMMISSIONER PETERMAN: Let me just ask a quick follow-up question for you because you mentioned that you lose some parties with the time and the cost. Do you have some fair certainty around the time and the cost when they first enter the projects? So, you know, I'm thinking about the transfer process is long, but is it certain? Or is there a lot of variation across developers? And do you lose them part way through?

MS. BROWN: A lot of times when they find out how long it's going to take them to go through the process, we lose them right there.

COMMISSIONER PETERMAN: Just at the onset.

MS. BROWN: Because the Planning Department will tell them, "Nope, you've got to go through CEQA,

that's a two-year process." Boom. That scares them a lot -- unless they have the time, if they have the time, that's not a problem, but for the most part, that will scare them away.

COMMISSIONER PETERMAN: And considering the amount of renewable energy that you have developed in Kern County, have you seen those timelines condensed with exposure and experience?

MS. BROWN: We've actually been fortunate in some areas that we have not had a lot of that problem. Our Planning Department has been amazing, supportive, in these projects. And they haven't really had to go through some changes to create some of the long-term regulation process, some of them have. We have projects now in planning that have been in there for a while. So some of them are waiting to see what happens with the financial end in the wind at the end of the year and different things, so we have been fortunate, we just hear that, you know, the Regulations can be a distraction.

MR. GALLEGOS: I think there are some other business models that are related to CSP that do have some attractiveness, and I think that it's a way to circumvent the absolute dependence on, you know, subsidies and other incentives to doing solar projects.

Case in point, I mentioned the Florida Power

and Light project in Martin County, that was an integrated solar to an existing power plant. And when we provide a solar field to an existing industry, there -- we're just giving them heat, we're not creating another power plant, so we don't go through all that permitting that you typically see. Let's say in Kern County you have oil field recovery using injected steam, you can provide steam all day long at incredibly low cost, incredibly low cost because I'm not putting in a power outlet, you know, a steam turbine and all the pumps, you know. So what happens is that that just automatically, you know, I could be pulling up with a truck with oil in it, right? Bunker oil or something to burn? It's the same thing, I'm just providing Btus. So we're not, as it were, creating a power plant. It's a really good business model and it's a business model that we're trying to apply in different parts of the world, but it really does circumvent a lot of the permitting and a lot of the cost.

Another case in point, we know that there are spending reserves at power plants on the California coast, coal plants that are probably going to be retired because they're coal plants, you can put a solar field right there, concentrated solar power, because we provide heat. The costs are incredibly low, incredibly low.

It's a great business model, we're not relying on any kind of subsidies or even, you know, what you typically would get or need. So there are -- go to market strategies that we have -- the next question is, why aren't you doing it? It's because we really are not good at marketing, okay? Let's put it that way. But, having said that, I think that there needs to be an awareness in the State agencies and California Energy Commission, the PUC, that there are these business models that can be pursued right now. And, again, it's just providing heat, we're not creating a power plant, different permitting, so it's a different paradigm. But that's one business model that could work, even now.

COMMISSIONER PETERMAN: Thank you for that.

MR. MILFORD: If I could mention just a couple of other challenges that are worse. Mark mentioned the continuing fight over the PTC and at the Federal level, you know, there was a Brookings report that just came out about three weeks ago, what you're seeing is about a 70 percent reduction in Federal Clean Energy support between now and 2014, without any Congressional action, and so assuming it might be approved and we hope it will be, PTC, but other support, I mean, so what you're seeing from the last three or four years until 2014 is a dramatic Federal reduction in support for clean energy.

So I think any state that is thinking about the future has to begin to think about Plan B, of the scenario of continuing reductions in Federal support in this industry, and it's not simply because of paralysis -- it's a lot of that -- but next year the debt problems are probably going to be much worse than they appear today. So I think, from a future financing perspective, in terms of retaining any competitive advantage, you have to start looking at different sources of capital, State support that may not -- that does not continue to rely on an endless supply of Federal subsidies for whether it's PTC, or ITC up to 2014, or other mechanisms. I think that's just the reality going forward.

I think, secondly, in terms of innovation, I think the state that actually figures out how to develop State policies to finance new technologies, crossing the so-called Valley of Death, is going to get a significant bump up and take a competitive lead going forward. There's been a lot of thinking about the CPUC about this, you know, how to develop or perhaps mandate some utilities that modify RPSs to require uptake of new technologies like storage, because a lot of the RPSs, as we know, which is fine, but basically encourage existing technologies. But we really don't have a system in place in this country to compel or get action across the Valley

of Death and then figure out how to finance it. And I think the state that figures that out and develops policies in that area is going to benefit from increased economic development, increased manufacturing and just in job growth, so hopefully there will be those ones out there.

COMMISSIONER PETERMAN: I just want to offer two comments based on what you said, Lew, and one, just reflecting on your comment about declining Federal subsidies because I think we just went through this period with the opportunity for residential ITC where you had declining State subsidies because you had seemingly rising Federal subsidies, and now we're finding ourselves in an opposite position. And then, on the PTC, and we've had a history of this boom and bust cycle, if you will, with PTC renewal and then having it renewed and being retroactive. So I was just wondering, has any financial entity provided some type of financing that will, if you will, bridge to PTC, especially? And I don't know exactly what the expectations were about the certainty of having it renewed, but just thinking about both the practical aspect of having this delayed renewal consistently.

MR. MILFORD: What to do in the --

COMMISSIONER PETERMAN: Yeah, and whether

there's a financial product where you were offering a slight interest, etc., you know, to make that bridge.

MR. MILFORD: I'll leave it to the wind developers to do this, but I think one thing that people are looking at now, I mentioned this in the opening, is -- and this doesn't solve this problem, but I think it could help, is to look to conventional bond infrastructure financing for project finance going forward, lower cost capital, longer term, accessing capital markets like pension funds, institutional investors. There's a growing interest among those players that know how to finance roads, bridges, hospitals, but they haven't really done much in this space. There are emerging, you know, interesting examples of their involvement even in wind and in solar and other technologies. I think, actually, going forward that's a very important trend to look to debt financing from bonding authorities. Just to give you an example of numbers, you know, in 2011, if you put the PTC and the ITC value together, it was about $7 billion -- about $7 billion. If you look to municipal bond financing, just in 2012, in the first three months of 2012, $80 billion of municipal bond financing around the country. I mean, so in terms of scale, if we're actually talking about scale, financing, lower cost capital, it doesn't match

with the way we've financed these technologies in the past, but I think in some ways we need to think about different ways to access different capital markets and different structures just because we don't have a choice, or may not have a choice.

MR. THOLKE: Yeah, I think -- I agree. I agree, Lew. You know, for the first time the wind industry has introduced a declining PTC, so for the first time, AWEA, which is the trade group, has introduced the concept of over four years that PTC basically declines in value, where that has never been the position of the industry before, so I think there is an acknowledgement that there are some realities with the state of affairs in Washington, D.C. But frankly, it hasn't moved very far, the innovation. The bonding authorities, the pay -- PPA concepts -- utilizing those lower cost of capital, I think we will see more of that, but that hasn't happened in much volume yet and, frankly, until the wind industry gets used to the idea that the PTC is gone, or being declined, or will be in decline, generally project developers are going to assume those are going to come back, which spells a tough year next year.

COMMISSIONER PETERMAN: Well, I am cognizant of the fact that we're having a workshop on June 6th on financing and R&D, I mean, I think the takeaway from here

is that we'll be able to have more jobs in the clean energy sector if there's more money in the clean energy sector, if the businesses are doing better, so acknowledging that, I would go back to Larry and follow-up on some of the more specific job-related questions. But thank you for that discussion.

MR. GALLEGOS: If you wouldn't mind, this is Bill Gallegos, I'd like to just offer a few ideas on this, also.

COMMISSIONER PETERMAN: Please, Bill, any time you want to speak, just start talking.

MR. GALLEGOS: All right. Just in terms of the advantages, I would say that, you know, what people have mentioned, we not only have an assured market, but it's a market that's absolutely going to grow, so I think that's something -- it's one of the largest markets -- it's the largest market in the country, I think that's a very strong pull. The other thing is I would say that, you know, so many of these questions are not just technical or a matter of economics, but they're political and I think we now have a majority of communities of color in California, and which is also emerging as a very strategic electoral force in the state, and poll after poll shows consistent high support for the development of renewable energy and for policies that address climate

change and global warming. So I think we have a very very powerful base of support for innovative policies, for policies that will really help us build a market here in California.

And then I do think that we do have -- we still, even with all the problems in our educational system, we still have one of the most, I think, outstanding higher educational systems in the country, and I think that does provide an incentive for the kinds of innovative research and development that is necessary for the emergence of this kind of a market. I do think, however, that it's important that, even within that, to consider questions of equity, that we should not just direct all of the research and development funds to the MITs and the Cal Techs, or the Cal Techs or the Stanford's, but also we should think about how we can partner with state colleges, community colleges, to really build up a broad and very robust research and development infrastructure in California for this.

And I think another advantage we have is that there's a growing developing workforce, trained workforce that can be utilized for the development of this new market. The problem is there's not enough jobs. I mean, that's what we're finding in our community, they're saying, "Yeah, you know, we went through all this

training program, where's the work?" But I do think that workforce is there and it's ready to go to work, and willing to go to work, and it's an increasingly well trained workforce.

In terms of some or our challenges, I do think we have to keep our eye on the fossil fuel industry, it's not sitting by idly while we're figuring out all the pieces of this emerging renewable infrastructure. They're pushing to put in as much fossil fuel infrastructure as possible, and that is a challenge to us. This is in some ways a zero sum gain, so the more they build out, the less capacity there is for renewable infrastructure, and I think we have to keep our eyes on that.

And then, finally, I think we still lack necessary policies to really ensure that we can build this new infrastructure out in a way that is as efficient and reliable, but also has the very strong commitment to equity.

COMMISSIONER PETERMAN: Bill, I just want to make one follow-up comment based on your comments. In our last panel, we had a lot of representation from community colleges talking about workforce training and workforce development, but you also hit on the fact that, at the same time, the State is providing a significant

amount of funding for R&D, and much of that is going to some of the larger research universities. And, you know, how do we further establish that connection between the research universities that are doing these innovative technologies and the training programs that are happening in the community colleges? Just something to reflect upon.

MR. GALLEGOS: That's right. I think everybody should go see that old film with Edward James Olmos, *Stand and Deliver*, which kind of gave an indication of the potential that exists in communities that we might not think about for that kind of really innovative research and development.

MS. CARR: Yeah.

MR. RILLERA: Please.

MS. CARR: I wanted to make a couple points also building off the advantages and disadvantages. I think one is that workshops like this are occurring in California and we're talking about integrated renewable energy. CEC recently put forward the Bioenergy Plan and, in that, it recognizes forest biomass, agricultural byproduct to biomass energy, but also dairy digesters, landfill methane, etc., and I think this type of energy source is very complimentary to wind and solar with the wind and solar being intermittent, but the bioenergy

being baseload, there may be an opportunity to co-locate in some of these areas.

Also, you know, when it comes back to forest biomass, one thing is that the fuel is inexpensive, it's abundant, and it's expensive if it burns where it's currently sitting, but it's very inexpensive as we transport it, and there's an opportunity in what we're seeing in other states like, for example, Oregon has put some policies -- incentive policies -- forward and they're getting to a point where they have enough places to utilize where the cost of transportation is decreasing substantially, and the value remains very low for the biomass. So, in the long-term, the numbers start to work out.

I think some of the negatives, or some of the disadvantages we have right now is that the Public Utilities Commission and other areas that are charged with ratepayer surcharge, there's just limitations as to how you can adapt those rates, and it's difficult for them to account for the societal benefits. So it can appear as, just on the accounting sheet, it can appear as a ratepayer increase if you're not accounting for the public benefits as far as reducing fire risk, all the costs associated with fire -- fire suppression, re-vegetation, transmission lines burning, etc. So being

able to address some of that so we can do more full cost accounting and really know the true value with any type of energy, any kind of renewable, and then comparing that to the traditional fossil fuels is an important exercise.

MR. RILLERA: Okay, great. I am going to jump in to question 2, and I think, Mark, a second time, and Ben's perspective, and perhaps Dorothy on the other end, as we look at question 2, and your report, which I brought, and your findings, if you will, with respect to the supply chain.

So, second question: How do project developers and manufacturers make choices about their supply chains?

MR. THOLKE: Okay, why don't I go first, with advance apologies, I do have a hard deadline at 4:30, so I'll gracefully -- well, with regard to how, you know, we're a developer, so we buy -- we purchase the equipment from others. And frankly, unless there is an additional pull, it's strictly cost-driven. And most of the time, that does not mean that it's the manufacturer -- the hardware itself usually is not manufactured in California. We do on the construction side, so I want to separate, there's the manufacturing hardware, and then there's the construction, now, let me address the construction first and then the manufacturing.

On the construction side, it's our business

model, and I think other developers' to varying degrees, but we took this very seriously to source locally for the construction jobs because we feel there's a business case with the permitting authorities, so we actually require our contractors to source locally as much as possible, and there's various mechanisms that we put in place to ensure that that occurs.

In terms of the equipment, I want to mention something that might get me in trouble from other developers, but the key leverage points from a policy perspective to ensure use of either locally or geographically specific manufactured hardware, there's two leverage points from my perspective, 1) the PPA because, without the PPA, we don't have a project, and 2) the Permitting Authorities, the Permit. If it is made a requirement of the permit, then we will come, the developers will do it. And that would be my suggestion there.

COMMISSIONER PETERMAN: Thanks. If it helps, we can kind of shade out your voice so people don't know who actually gave us those suggestions, but --

MR. FOSTER: I guess I'll go next. Certainly, we have the opportunity to evaluate dozens of different proposals from vendors like yourself and others, and we can see that, clearly, prices offer a buying decision

perspective as a key goal, as well, as much as we deal mostly in larger-scale projects, non-residential, municipal utility-scale, and from a buying perspective, everyone wants the best price. There's a quality component which is increasingly important, and it goes to an even bigger factor, which is the market consolidation that's well underway right now, which I think is a good thing because it means that, overall, there's more importance on stability, there's more importance on quality. We know that quality and stability is not uniquely a U.S. trait, but it's certainly one of our strong suits, overall, compared to some of the global competitors that are out there, that may be relatively new, maybe a couple years ago we were making socks, and now we're in the solar industry and importing here. So there are certainly opportunities, I think, to take advantage of that and look at ways to support the local market from a California perspective for the U.S., whether it's requirements or just understanding that pull of more and more projects that get the local component manufacturers, local providers of technology, maybe even recruiting companies from overseas, to create manufacturing here that is at scale, to be cost competitive. So certainly price is important, but vendor stability and quality, we see an increasingly big driver

-- again, from a price perspective when that passes through into the vendor's or a developer's perspective, as well.

So making sure also, when we're looking -- related to this topic is that, again, from a U.S. perspective, and specifically for California, there's tons of great technologies being developed here, being built here, that's being shipped outside of the state lines, again, that's not being captured; take companies on energy efficiency side, from controls, from underlying manufacturing equipment, you know, people look at solar, for instance, overall, we're a net exporter to a large degree of solar-related products if you look across the entire sector. So although it is cost, I think there's an angle to be played here, not only from a vendor perspective in terms of looking at which ones are strong and how do we support them, but then also as a job creation, is how do we support that brand that is California to the rest of the country and the rest of the world, just like we do with so many of our other agricultural products, and others, you know, the great branding campaigns about why California is a good place to make or grow things. I think in the clean energy sector, there's a pretty big cap there that we haven't even begun to address, and I know that's maybe not

exactly within in the purview of the CEC, but something that could really make a big difference.

COMMISSIONER PETERMAN: No, I want to throw up another potential leverage point for you all to consider in your comment, either now or in your comments. Another approach is having a higher incentive for equipment that is sourced locally and the one example I'm familiar with is Los Angeles has a higher incentive for their solar PV program, if you source your modules in Los Angeles, and I think it's had very limited uptake, partly because the incentive -- it doesn't meet the differential on costs you would have perhaps between different solar panels, and so, acknowledging that type of incentive can only be so much, I'm interested in hearing which technologies, for example, or elements of the supply chain across all the renewable technologies, are at such a cost differential, that small enough, that a higher incentive could change the purchasing decision. So, just something to think about because I think, with modules, it's particularly challenging, but there might be something else in supply chain, or across the other technologies that would be worth considering such a type of differentiated incentive.

MR. FOSTER: I would just like to say one thing related to that particular comment, which is -- and I'm

sure the economists in the room that were here earlier would have something to say about this, as well, is that you can't close the border so tightly that it's just what is manufactured here gets incented. I mean, if you look in Washington State, I believe, where they've done a big incentive for locally manufactured products, and Solar World is one of them, which is also one of the leads with the trade dispute, but they also happen to be so dramatically higher in price that that incentive just, you know, to a certain extent that can be profit that gets passed back on without actually re-yielding a net price decrease in the market. So just a concern that we've seen where you see that kind of really tight border, like in the City of San Francisco that has a differential incentive if the installer happens to be local, or others. The people that work for that company could work anywhere, right? They could work across the city lines, across the county lines, where the company happens to have a physical address or where they happen to do some manufacturing, if it gets too tightly constricted, it causes some odd things in the market and ultimately there's not enough uptake of those programs. So I would just say, where we've seen those programs directly around the country, it does create some odd incentives and odd economics.

MR. MILFORD: There's also, you know, depending on how you frame it, potentially a commerce clause problem with this, which I'm sure California is very familiar with, with the fuels challenge. So it's something you just have to keep in mind, it comes up all the time in the Renewable Portfolio Standard efforts to do something similar, so you just have to be careful in how you structure something like that.

COMMISSIONER PETERMAN: Indeed. You know, it's interesting, though, because I think you look around the country, and you can speak to this more, Lew, a number of states do that and they seem to not face the commerce clause challenge, but I'm speaking about this in the general exploratory, before any economic or legal analysis, but --

MR. MILFORD: Yeah, oh, absolutely. No, I think it's something absolutely to be considered and I think a lot of states are trying to figure it out in the same way. I think what's happened so far is there hasn't been necessarily a well-heeled litigant who actually wants to challenge it. In some ways, I think that's given states a lot of freedom to do it, but I think the fuels case that you have, that's going up, might set the stage for how some of these things have got incentives, and RPS laws might actually get figured out -- for better

or worse.

COMMISSIONER PETERMAN: Thanks.

MR. FOSTER: Just one more comment along that line. And this may come up on the next point, which is that ultimately the rest of the country and the rest of the world are really far down that learning curve compared to where we are here. Certainly, in Sacramento, certainly in those areas of California that have done a lot of solar installations and are familiar with it, as soon as you step into those areas, whether it's around the state, or around the country, or around the world, they're not aware of many of the technologies that even exist, as Glenn was saying here, his technology is cost competitive, and yet there are very few people that either understand it, or know about it, or are confident in it. And so, dollar for dollar, I believe, without having the numbers to back it up, is that taking that money and if there was some funding to basically cast out a wide net to a larger market in terms of the opportunities for California to create a technology service's value added activities to the rest of the country, the rest of the world, would be a much better return, rather than trying to close off the borders and saying, "We're only going to put it in this really tight market," because ultimately you want a bigger market, so

focusing that money and incentives outside, rather than inside, would probably yield much better results.

COMMISSIONER PETERMAN: Okay. I think about more shining the light inside vs. ever closing a border, but fair enough.

MR. RILLERA: Question 3: What noteworthy policies, strategies and programs are other states employing to facilitate growth of renewable energy supply chains that may have merit for California?

MR. MILFORD: Well I can touch on a few. We're -- it's almost becoming fairly commonplace for states in Florida, Maine, Michigan, and there are a host of others, that actually have fairly dedicated State level supply chain programs, you know, where states like Massachusetts and others are actually financing studies of, you know, solar supply chains, offshore wind supply chains, storage supply chains, in order to figure out what the size of that industry cluster is and then, in turn, use that data to determine whether, much like you're suggesting, and for a range of things, whether they could better support that cluster through incentives, policies, procurement requirements, and the whole bit.

So I don't know enough about California to say whether they've gone down that road, or whether you have those in place, but if you don't, or don't do it

aggressively, I would suggest that there's an opportunity to look to many other states that are experimenting with exactly this problem. And then, in turn, what that does is give you the data. I mean, again, without the data you can't have a good policy. And so it tells you what you have and then, in turn, it gives you suggestions about where you need to work and where the gaps actually need to be filled.

And just in terms of the data, I just wanted to emphasize the point that I made earlier about finding out what you have, I think, is really critical. And, again, it may be California has this, or pieces of it in different places within the state, but I think the program -- and it was a fairly inexpensive study, it was a $400,000 study that Massachusetts did to determine essentially the size of its clean energy sector; it took them about a year, maybe 18 months, something like that, 65,000 jobs -- which, in Massachusetts is, you know, it's a single digit percentage of the total workforce, but it was a lot more than they thought. And it was enough to get the attention of the Governor and to basically establish that it was one of the top 10 emerging sectors within the economy, and in Massachusetts that gets people's attention. So, you know, it's an important data point to make policy, but then, secondly, you know,

there's always politics involved in all of this, in a good way, to be able to prove what you're doing is a good thing and then to figure out how to do it better. And there are a lot of examples we can give you, a lot of examples of this that are happening.

But I think it's really critical. And, maybe California is there, I'm not sure, maybe it could do more in that area as part of a larger renewable policy beyond the project support, which is where obviously you folks have led the way, but I think other states are kind of catching up in the incremental policies. They know they can't compete with California on project finance, and so what many states are beginning to do is to figure out how do you begin to tinker with economic development strategies to keep what they have, or grow what they have and compete in that way.

MR. RILLERA: Lew, we had Governor's Office Economic Development 2010, almost exactly that, and it was a survey of the state's assets, if you will, to develop the metrics and analytics for an economic development strategy. Any response to kind of that now, today, focused on renewable energy development, and given the assets in our physical environments throughout the state, as well as the capital with the venture community?

MR. MILFORD: Well, I mean, if it hasn't been

acted upon, you know, in a serious way, I'd say that that should be a significant top priority. You know, again, you folks lead the way in figuring out how to do project finance, I mean, that's clear. But I think, again, you can't stand still, and in a way, I like the idea of obviously growing the market through exporting what you have, but at the same time as a way to address manufacturing capacity, new technology, growth of the sector is to really have a significant serious funded -- and that's always the problem -- economic development strategy that tries to pull all the pieces together, and it can't be a completely top down, I'm not saying that it should be, and you obviously have a very strong decentralized economic development strategy in the state with counties and the like. But so do states like New Jersey, I mean, New Jersey has a very strong county economic development system, but they tee off a very strong New Jersey Economic Development Authority that has manufacturing grants, bonding authority, supply chain support, I mean, they work very hard at this at the state level, and you know, if California isn't doing that yet, or is considering it, I would really put that high on the list, keep what you've been doing at the project level, but really strongly figure out how to complement that with as strong an economic development approach that has

all these pieces.

And I think the beauty of this, what's happening is, you know, the world and the country is figuring out clean energy is beginning to be treated like a conventional industry, and so how do you grow it? How do you expand it? How do you avoid the mistakes that have happened in other economic development strategies by poaching companies from other states, and zero sum gain approach -- the Brookings Institution has written some great stuff in this area about cluster development, growing what you have as a way to go, rather than trying poaching and picking from other states, which basically people lose and win, and the idea is to create winners all around.

COMMISSIONER PETERMAN: And, Lew, you know, we do work with the Clean Energy States Alliance, and so we can follow-up on this point online, but as you're speaking, one of the things I was reflecting upon, and I'm from New Jersey, so I'm really excited to hear what they're doing there, but it's a small state, you know, you can cover the whole place in an hour and a half, a couple hours, and so I was just wondering, you know, taking those examples and then comparing them to California and just to what extent are there going to be these supply chain differences, or these sub-regions that

we need to be considering in California, and looking at the state level vs. are there issues with looking north-south, so just would welcome your thoughts about how we would approach that type of analysis.

MR. MILFORD: That's a great one, you know, I don't have any quick answers, but certainly you would have a much more decentralized strategy than probably they do, and then you've got a strong infrastructure to work with, it sounds like. But I think, nevertheless, it's sort of the same approach and I think it's sort of a policy approach to say "this is as important as project support, and we're going to dedicate time, attention and effort to do it in a way that makes the most sense," learn what you can from other places, but California is always going to be different because of scale.

MR. FOSTER: I think I'd like to add on a little bit more from my opening statement, which was that, all projects happen locally, every one of them, and you're here from Kern County because every project has to be located in some particular municipal agency's jurisdiction. And that's where the rubber meets the road, projects don't happen if the folks there locally don't understand, or don't have the policies or the tools available to them, to support that effort, the same with biomass and others, I mean, if they don't understand how

to do it, or what the technology is, or what the financing, or they don't have enough critical mass of the infrastructure.

Within the ARRA program, one of the things that we found nationwide is that, wherever you find that sustainability person that had the role to figure out what are those best practices that are going on around the country today, what's been tried, how do we do it, they are light years ahead, literally. I mean, they've already done projects, all kinds of projects, and tried fuel cells, and tried co-generation, and then tried solar, and micro wind turbines, and everything, and then they're able to evolve those into residential programs, commercial programs, in school curricula, very far advanced, and yet that's only a small sample of all the jurisdictions that are out there that could have these projects.

And so, some way to take those efforts out to the rest of the state, to all those jurisdictions, all the folks, whether it's facilities managers, or finance people, or planners, they just don't -- although those tools have been developed and tested, they just haven't been deployed. And so there's this gap between what's really possible today in any one location, any one community, and what is possible and what they actually

know how to do. And so supporting them through that effort would go so far towards -- really far towards getting to those goals that we want to see, which is more deployment, more jobs, more programs that can support the new technologies as they emerge. So that’s an area --

COMMISSIONER PETERMAN: Can I just inter -- sorry, I apologize. I would just interject and say that those are good points that we are considering now at the Commission, so with our Special Projects Office, working with the County, we have these Energy Awareness Guides, and really just trying to serve as a portal for a lot of the information that's already out there. And when your website is Energy.Ca.Gov, people go to you for lots of reasons, and so it's a good way to accumulate some of that information. And we've also had, at some previous workshops, some representation from the Association of Counties and I'm not sure of the appropriate formal name, but with having the County Planners working together on standardized permitting, things like that, and really trying to leverage some of that County experience, you know, county to county.

But to your point, that's where we also, I think, see the next step about just facilitating those connections for the work that's already being done.

Bill, anything online?

MR. GALLEGOS: No, not right now.

MS. CARR: Could I just make one comment?

MR. RILLERA: Please, Kim.

MS. CARR: Yeah. I just wanted to speak, I complete agree with Ben's thoughts, as well as the Commissioner, and I think that, you know, in the urban area it's certainly true and I think it's exacerbated as you look at it in the rural areas because there's so little capacity, so when they go to do a project like this, when they have to start to go to different State agencies, County Departments, Federal funding programs, and try to track down where is the financial assistance, where do I get the technical assistance, that type of thing, they quickly lose traction, even though it's a great vision.

And just one thing I wanted to mention, what we're seeing in some of the states where forest biomass is taking off, is they are forming councils, or working groups, energy forest kind of councils, and it's this idea to integrate the different tools that are available to foster the industry, and then identify the gaps that are needed, whether it's in policy, procurement requirements, etc. And just, Oregon is really a model that we look to, and in their '06 Renewable Energy Action Plan, they put in a tax credit, $10.00 for a green ton of

forest biomass, and then three years later they had the University of Oregon go back and evaluate it, and they found that it really did help prices with wood fuels markets remain competitive, and also they found that it created more economic activity than the program cost by foregoing the tax revenue, by about two and a half times. So we can look to things like that and try to support them.

MR. RILLERA: Okay, great. Thank you. Question 4: What opportunities are there to leverage renewable energy development as an economic development tool in disadvantaged and/or Environmental Justice communities?

COMMISSIONER PETERMAN: Bill, do you want to start off on this?

MR. GALLEGOS: This is Bill, maybe I'll start it off. I think there are a lot of opportunities and the first thing I think we need to do is clearly identify the disadvantaged Environmental Justice communities, and I think we're very very fortunate in California that we have a proven tool for making that identification and that's the Environmental Justice screening methodology developed by Dr. Rachel Morello-Frosch, from Berkeley, and Manuel Pastor from USC, and Jim Sadd from Occidental College, and that one of the things that I think makes

Environmental Justice communities particularly gratified about this particular methodology is that it was developed in conjunction with Environmental Justice organizations, such as CBE. And so we feel like there's a real, not just kind of an academic understanding of the needs of our communities, but a real engagement with our communities in a way that really enriched the development of this tool. So there is now an instrument that we can use to say, when we talk about disadvantaged communities, disproportionately burdened communities, Environmental Justice communities, who the hell are we talking about? Well, now we have a way to make that identification and I know California is still deciding whether or not it's going to use screening methodologies, it's going to adopt, from our view this is by far the best one and we'd like to see the state adopt this tool so that we can really correctly identify the communities that should be getting the benefits from this renewable energy infrastructure.

The second thing is I think we have to have policies that really allow for the development of small solar projects, one megawatt, and half a megawatt or less, so that we can build them in inner city communities and poor rural communities. So I'm happy to report that today Assembly Bill 1990 passed the Assembly with a

significant majority of votes, and this would allocate 375 megawatts for those kinds of small local solar projects with the specific designation that these project should be built in disadvantaged communities, with the intention of creating jobs and economic development in those communities. So it's a very innovative policy that the State of California is starting to move on; this has been spearheaded by the California Environment Justice Alliance. But I think this is the kind of thing, this is kind of a model, and this is a pilot for the kind of policies that California needs to adopt on a much larger scale. And I think this would really ensure that we have the policies and the tools necessary to make certain that the benefits of this emerging economy, of this emerging infrastructure get into the communities which have historically had the worst of the old infrastructure, and really that equity and justice should require us to ensure that they get the benefits of this new one.

So I think those are some of the things. You know, the other things, policies that would really facilitate the development of these local projects, like Feed-in Tariffs. We also happen to favor Community Choice Aggregates as a way for communities to really become involved and have a lot of buy-in in this new infrastructure, in this new, I think, very exciting and

innovative approach towards building our energy grid. So these are some of the things that we think would really go a long way towards ensuring that the communities -- the disadvantaged communities -- would really get the benefits from this.

MR. MILFORD: Could I add one thing, I think, that's just absolutely terrific. One other aspect of this, I think, is to get more capital into the communities to fund these projects. And one potential source -- and, again, I can't speak to California, but we're working in a number of other states with Community Development Finance Institutions, CDFIs, that typically now finance low income housing projects, other projects in urban and rural areas. Many have done some projects, mostly efficiency projects, not much on the generation side, and many of them are now interested in doing more, there's an organization called the Opportunity Finance Network, which is the membership organization for all the CDFIs around the country that we've started to work with, and I think there's a real opportunity to try to marry the policies like that, that Bill has mentioned, they sound excellent, with tapping some of the local capital in banks because of the Community Redevelopment Act and they're financing CDFIs to get CDFIs, in turn, to try to expand the capital application to these projects in those

communities, so it could be a good marriage.

And just lastly, you know, there are a number of places like New Jersey, I'm from New Jersey, as well, so I mention New Jersey, and using municipal bonding authority to finance local solar projects, and very simple straightforward revenue bonds where municipal authorities are floating bonds to finance projects and public facilities, and they've done about $180 million worth of projects so far, which isn't bad. And these are fairly straightforward, developer leasing arrangement, and selling power basically below utility rates. And so the bonding authorities are really the key financial players in that. I think that model could be significantly expanded to communities all across the country.

MR. FOSTER: And, Larry, I'd like to echo what Bill was just saying, as well, is that we really see that there's just a huge need and opportunity in those communities that have not been well served under some of the other energy-related programs, to date, especially those that are economically challenged. And, in fact, late last year, we successfully were able to get a major grant from the Department of Energy through the Rooftop Solar Challenge Program, and our focus was specifically on those underserved communities around the state, so our

focus is actually, in California, on 14 municipalities in the San Joaquin Valley Area that, as you know, of course have higher than average, much higher than average in some cases, unemployment, but have huge solar potential, great resource space available, they want it to find new economic activity, to replace some of the construction jobs and others. So, as part of this program, we call it the Southwest Solar Transformation Initiative, and within that, what we've quantified across just these 14 communities alone, that if half of the RPS goal was built out through regional distributed generation, meaning community solar, or on-site, or locally sourced solar projects or other renewables, that could be over the next five years about $5 billion worth of incremental economic activity. That's using the JEDI model from the folks here, but assuming the products themselves are not locally manufactured. So there would be an upside, of course, if the products themselves were locally manufactured, that's just the construction-related jobs. That's huge. Because it means that, by having the right programs in place, by pursuing best practices on permitting, interconnection, as well as market development programs, that they haven't really tapped into, and also helping the market to mature, meaning that the installers for other communities, from a workforce

development perspective, are more effective at delivering lower costs, which are key to getting more adoption, could unlock that potential. So this particular model is based on a collaborative effort that we had proven in the Silicon Valley area and also there's additional rounds, and that first round was a winner of the Governor's Economic and Energy Leadership Awards last year, so taking that model to a much broader base, and so we're really pleased to be able to basically take that model to those underserved communities. And I encourage anyone that's interested in following along and finding ways to leverage that around the state, to feel free to let us know, or follow it on the website which is solarroadmap.com.

COMMISSIONER PETERMAN: I'll also just add, first of all, Bill, thank you for talking more about the EJ Screening Tool, you know, when you're talking about that, I think another opportunity to leverage renewable energy development in Environmental Justice communities, is making sure that, in all the mapping efforts that we're currently undergoing, that we have that layer, you know, whatever those communities are that you identify through your screening tool, because I think we found the mapping to be beneficial in terms of really the high priority areas, you know, overlaying multiple goals we

have. And we had a workshop on identifying priority areas for renewable development and one of the areas, one of the preferred places that came out were marginal lands, you know, former Brownfield sites, various places like that and, you know, thinking about that layer on top of the resource potential layer, because I think that's really where we're starting from, you go where the resources are best, at least thinking from the larger scale perspective. And I know a lot of the discussion for Environmental Justice communities has been about DG, but I'm also interested in what potential is for overlap with large-scale opportunities, as well. And so I want to make sure we continue to connect with you, to make sure that those areas you're identifying in the methodology are in the mapping that we're doing across our various work here at the Commission.

MR. GALLEGOS: I think that's a great point and we should continue to have those discussions.

COMMISSIONER PETERMAN: And I saw, I think someone from SEJA on a previous panel, another day, presented some maps, so I know you're always thinking about mapping, as well. Larry, I would just say that we can go maybe five more minutes before public comment if there are comments and such. And if you're interested in making a public comment, please provide a card to Susan

Korosec, who will provide it to me. If you're on the phone, please identify if you'd like to make a comment, and if you could just give me a signal about how many comments we may have, so we can time it appropriately. Thanks, Suzanne.

MR. RILLERA: So maybe we'll go around the table real quickly if you have any last second strategies, recommendations, before we open up the public comment. Please, Melinda.

MS. BROWN: I'll just say take advantage of the opportunities, the areas that are successful, you know, maybe that can work with these disadvantaged areas, and I'm going to just talk about Kern, but Kern has been very successful, you know, take the best practices -- why is it successful? Why are these companies going there? And take those opportunities and work with it, educate your population and your communities, you've got to get the support from them in order to make these projects work. They need to understand the value of renewable energy, you know, get support from your Regional authorities, whether it's your Council, or your City Councils, your Board of Supervisors, get them on board and support. I know in Kern County, our Board of Supervisors are involved in just about everything that's there, and you know, they've got the business-friendly environment, our

Planning Department goes through very smoothly. You know, what are they doing that makes it so easy for these projects to go through? And don't reinvent the wheel. And I think that would really help some of these smaller areas that have the opportunity for solar growth, wind growth, maybe not so much wind, but solar growth and make it successful. We're always looking for creating ways for job creation and that would be a great way to take advantage of what is successful.

COMMISSIONER PETERMAN: So, Melinda, let me ask you a follow-up question. What is Kern County doing to get projects developed there? You're teasing us here, but we've got it on the record now, might as well find out.

MS. BROWN: Well, I think it's two-fold. We're fortunate enough to have, like I said, the resources, okay, the topography is there, you know, we've got sun 300 days a year. But it is the easy permitting fast track; I mean we don't have a lot of issues getting these projects approved because we have the regional support. And Regionalism, throughout the state, I think, could be helpful and so everybody knows what's right. We've just been very fortunate. Lorelei, our Director, she's been actively involved in the wind energy and she's now the Director of our Planning Department, and she's great, she

just works well with the clients and there's no delays. So, unless there's an actual problem with the project, we're experiencing some issues now with solar vs. Ag land, they don't want solar projects on valued Ag Land, well, what's that? You know, what's the value added Ag? And then, if I'm a farmer, why are you going to tell me I can't put solar on my land? So those are some of the issues that come up, but that's a bigger area than just Kern County, itself. That's a valley issue.

COMMISSIONER PETERMAN: Well, I would say, you can give the panelists a couple more minutes to think about final comments and new recommendations for us because we have one public comment so far from the audience, so let's hear that, and if there's anyone on the phones, and then I also want to make sure we hear from Bill again before we wrap up. So, Babette "Barbie" Beaudette. Yes, excellent. Welcome B-cubed, here you go.

MS. BEAUDETTE: I just wrote down my name, so you caught me a little off guard. I'm a student, so I've been through some of the CEWTP funding programs and that, I actually used to work in construction, you guys talked earlier in the previous panel, panel 2, about the programs that are available, some of the things that are missing -- wow, this is feeling loud -- and so I just,

having gone through those programs, there were a few things I saw that weren't mentioned, and some of them that were touched on, but that I thought I could add a little bit to. One of the things that was talked about -- obviously, we have the 2030 goals, and that's going to create jobs somehow. A piece that I've noticed that was really successful with the ARRA funding was program development, like at my school, Consumnes River here in Sacramento, they invested in creative programs very quickly to support jobs, but once again, there's pieces missing like, for instance, on-the-job training sorts of things. Something I noticed in going through the program -- am I really echoing really bad? It really sounds --

COMMISSIONER PETERMAN: Maybe step back six inches.

MS. BEAUDETTE: Is that better?

COMMISSIONER PETERMAN: Okay, step forward six inches, okay. Perfect.

MS. BEAUDETTE: Is that better? Okay. I'm echoing in my own ear, it's hard to talk. But a big thing that was missing was, like, for instance, the New Solar Homes Partnership, the funds weren't spent, so a lot of the jobs that were expected didn't happen for solar. For doing energy efficiency, there are lots of folks out there qualified to do inspections, but those

are considered special inspection jobs, and this is at a time that the Cities and municipalities and counties have cut back on doing inspections, so I just went to a career fair, I just graduated like two weeks ago, and I went to a career fair at my school, and the Building Inspectors, the head Building Inspectors for three counties were there and said, "We don't have money even to inspect for fire and life safety." So if we're going to implement Code, heavy Code, and put that on the Building Departments, that might be an opportunity to partner for internships because they don't know how to inspect a lot of this stuff, and we've been training expertise, the same thing alongside some of the industry partners having that on-the-job training money that I see through the WIA funds that are still there, being able to use that for some of these graduates that are out there competing against new graduates -- against new graduates -- and it's just kind of piling on and there's also no central place to look for green jobs. You Google "Energy" for jobs, or you Google "Sustainability," and everybody has put it in the name of everything, so it doesn't bring up the jobs that fit this industry, so it makes it hard for employers to find people and people to find jobs, especially when you have a lot of dislocated workers who have come into a new time of looking for jobs, they don't

use the Internet, they're not used to that, so I did a search and I found hundreds of jobs, but I found that 10 of them were the same job, just listed on a crawler in the Internet. Finding a central place to list jobs would be a really huge step, and maybe that might be something the Community Colleges, since they're more focused, they can't really do R&D so much, they don't have the funding, but they might be a great career technology source to do those sorts of tests for the market and create models for partnerships.

And then the last thing was the piece about having a lot of people who are looking for jobs that are returning to work, me being -- I have several skills that would fit to many of the jobs that are out there, but actually the employers finding me, or me finding them, is extremely difficult, not only because I came out of a school without the knowledge of the Internet searching, I've been doing a lot, but it's overwhelming, so making that -- I know a lot of the industries have created, okay, BPI has a brand new career page where you can post a resume, but a bigger version of that, that wasn't just one company, or one organization, would be really really cool, if California could come up with something along California Green Jobs, or something, would be really cool.

COMMISSIONER PETERMAN: Are you currently employed? Are you looking for a job?

MS. BEAUDETTE: I'm looking for a job and trained as a BPI -- I'm BPI certified and I'm going through the California Whole Home Rater Training, and I graduated with a degree in Building Inspection, and I have a Bachelor's Degree in Construction Management and Real Estate, so I was displaced when the economy took its downturn. So that long gap in employment, you know, the big huge gap that some people are facing, that's another big obstacle that I meant to mention, the OJT, just getting your foot back in the door and employers familiar with you, so the job shadowing, there's got to be a way to create partnerships that would be helpful to companies and to the people looking for work.

COMMISSIONER PETERMAN: Are you looking in the Sacramento area?

MS. BEAUDETTE: Uh-huh.

COMMISSIONER PETERMAN: Well, if you feel comfortable, state your name again very slowly for the record and your email address, and if anyone has a job for Barbie, email her and that would be a successful outcome for this workshop for us, but only if you feel comfortable.

MS. BEAUDETTE: Actually, didn't you guys state

my name and --

COMMISSIONER PETERMAN: Well, I stated your name, but probably not correctly, to be honest, because the writing is a little challenging for me, and I don't know your contact information, but if you have a public email, this is the time.

MS. BEAUDETTE: Okay. Well, my email address is b.beaudette@hotmail.com. And my name is Barbie Beaudette, that's just easier than -- and I wasn't meaning to make this a plug for me.

COMMISSIONER PETERMAN: That's the nice part about being up here, is I can kind of say most --

MR. GALLEGOS: This is about job creation, so….

MS. BEAUDETTE: There's just -- there's so many small little pieces that I see that are missing, I started going to school in 2008, and I was so excited, but so many things have fallen through the cracks and taking time to roll out the funds for different programs and stuff, that I've seen a lot of missed opportunities, and so it's like, you know, those few little pieces would be really helpful.

COMMISSIONER PETERMAN: I appreciate your comments and I think you've commented on a general challenge for everyone trying to find a job, which is not just specific to this industry, just that there are a lot

of people graduating with skills and less opportunities, and we are doing what we can to get the money out sooner, and more money is available, but I'm glad that you were here all day, I noticed that, and I appreciate your interest in this, and you've provided some good suggestions for us, as well. So thank you.

MS. BEAUDETTE: Thanks.

COMMISSIONER PETERMAN: Anyone else in the room? Anyone on the lines with a public comment? No? So, Larry, I'll turn it back to you for wrap-up and comments from everyone as appropriate. Thanks.

MR. RILLERA: I just wanted to thank everyone on the panel for participating today and those that attended all day long. Patrick McGuire, thank you, I appreciate the Governor's Office of Business and Economic Development. Did you have any other comments you wanted to add?

COMMISSIONER PETERMAN: No, I would appreciate going around one more time with the panelists, any final comments or final recommendations, and do not forget Bill on the line. And then I'll wrap up with a comment or two.

MR. RILLERA: Okay, one more time --

MR. GALLEGOS: Maybe I'll just jump in.

MR. RILLERA: Thanks, Bill.

MR. GALLEGOS: First of all, thank you, Larry, and thank you, Commissioner Peterman, for organizing this discussion. I think it's really so important and I know one of the things that our organization would like to do is really share what the outcomes of this discussion, some of the ideas that were here. One of the things, I'd really like to second Melinda's suggestion that we find a way to collect the best practices, and we find some way to really determine those best -- to identify those best practices, and to put them in some kind of compendium that we could all access, that would really be meaningful for us, because there's no sense in reinventing the wheel, and if there's good stuff going on out there, I think we should really find out what it is in some systematic kind of way, and make that available for folks.

The second thing I wanted to say, just shortly, is I think as we're looking at this renewable energy infrastructure, we should look at the whole continuum, so I think that -- so we've talked about manufacturing, but manufacturing, research and development, installation, maintenance, disposal, all of the potential pieces of this economy, and really determine the policies that are going to enable us to get the most out of it from an environmental point of view, from an economic point of

view, from a public health point of view, so very very deep concern to our communities, and develop the policies that are really going to enable us to really realize those possibilities. So I think sometimes we look at this economy and we look at discrete parts of it, and that's very understandable, but I think let's keep the bigger picture in mind and make certain that we do all that we can to maximize the full potential from the whole thing. And you know, the specific interest that we have in this is for the state as a whole, and for Mother Earth, of course, but also to ensure that the benefits from this full continuum economy really get into the communities that have been traditionally left out. So I think as we're looking at this bigger picture, and we're deciding on what kinds of policies need to happen to actualize it, let's make certain that we're not losing sight and we're engaging with the communities that really deserve the benefits of this new infrastructure.

MR. RILLERA: Okay, thank you, Bill.

MS. CARR: I just had a couple things. You know, I really like some of the ideas that came forward today as far as cluster development, and looking at what's appropriate for the landscape, whether we're in the desert, urban areas, in the forest, really what makes sense, and then linking that to what the communities

need.

I think one thing we should look out for is a diversity of jobs at different skill levels, so you have the mechanical work in the forest, or the solar implementation up to the higher skilled jobs, actually operating the facilities and that type of thing, but looking for that diversity and matching it with what the communities need.

Also, just continuing to target the disadvantaged communities, a lot of rural California meet the guidelines of disadvantaged communities; the Native American populations are largely in the rural areas, so looking for opportunities for them for employment, that particular sector has some of the highest unemployment.

And then just the diversity of renewables, matching the renewables that have a baseload as well as the intermittent renewables. And I would just ask that we continue to keep rural in the discussion, the rural needs, and then also just the smaller scale renewables in this larger picture.

MR. RILLERA: Thank you, Kim.

MS. KORBER: Again, from a broader statewide perspective, nearly all of California's renewable energy incentive programs were created before the 2008 recession hit, so they weren't created with a specific job creation

model and sort of wrestling them into becoming job creators may be difficult. So we'd like to suggest that some of that half a billion dollars a year that California collects from ratepayers and taxpayers, go specifically to job creation, things like -- people have mentioned here just the simple idea of having a Green Jobs Database to help people that can't just Google the words "Green Jobs" and find 10,000 unrelated things, I think that was great.

In general, we think that the safest bet is to maintain our current investment in education and basic research because the culture of innovation is so unique here and we don't want that to wither. And you do get some manufacturing from that, too, with the prototypes, but as far as those tantalizing manufacturing jobs, and this will be something discussed, I'm sure, at the June 6th workshop, really think you should consider the idea of a Public Green Bank that would take some of that half a billion dollars, maybe some of the Cap-and-Trade money, also private investment, and put it into making low interest, low expense loans for companies like you, Glenn, so you can take your good ideas --

MR. REYNOLDS: Yeah, I like that idea.

MS. KORBER: -- and get from the innovative side across the famous Valley of Death of, you know,

commercialization to the fabulous marketplace.

MR. REYNOLDS: Yes, yes.

MS. KORBER: So please take a serious look at the Public Green Bank when you get to that point next week.

MR. RILLERA: Okay, thank you, Dorothy. Glenn, please.

MR. REYNOLDS: I think that --

MS. BROWN: I -- sorry.

MR. REYNOLDS: Go ahead. Melinda, you first.

MS. BROWN: We're all looking for job growth, but I think what we have to keep in mind, and it comes back to what Lew says, what do we want as a state in the renewables? I mean, I think Bill mentioned, too, that there's workers out there, but the jobs aren't there. And that’s because we aren't building our renewables fast enough to employ these jobs. We're almost training before there are actually jobs there, so what are we training for? We've experienced that also in the Valley. You know, we want to train for renewables, but the jobs aren't there, so we don't know what type of jobs to train for. So I think we have to figure out as a state which direction we're going to go, funding projects? That may not work. They can't get the matching funds, they need -- the investors aren't there, we're going to lose some

of the smaller projects to the bigger players because they have the financing. So I think, you know, he's right on target, we need to understand as a state where we're going with renewables and what do we want to see. That's the only way we're going to get job creation. That's just my opinion.

MR. RILLERA: Thank you.

MS. BROWN: Thank you.

MR. REYNOLDS: Well, obviously, you know, renewable energy has and will continue to create jobs, but I think the big issue is the stability of policy and the accompanying funding, whether there is variability in policy and things change, it's really hard for the private sector to build a successful market model on that. So, you know, there is some need there. There needs to be some policy stabilization and consistency. But at the same time, I think that the private sector needs to make a pledge, you know, to our state and everybody here, and that is to go for unsubsidized solar power generation, because once you go unsubsidized solar power generation, it doesn't matter so much about the variability of policy. So that's what we are committed to do at Gossamer, actually not just Gossamer, but in our second generation, we have also been cooperating and working very closely with 3M, and 3M is here today, Dr.

Dan Chen is sitting right there, they're very interested and they have about 220 factories sprinkled out all over the world, but most of which are in the United States, and he's wondering where to put a reflective panel factory, we've been discussing that. I mean, there are real issues here, there's real real issues, I mean, we're not just theoreticians, we're practitioners, we have hardware deployed, it's working today -- 50,000 collector frames are working right now, most of them in Spain. We need some operating in California.

MR. FOSTER: Right now, there are tens of thousands, probably hundreds of thousands of systems, solar system that could be deployed without any change to policy, without any innovation in technology, there are more than enough people that could serve that market, there's more than enough manufacturing capability around the state, so why don't they have them? They could. You know, there's facilities right here in the Capitol, itself, region, that could easily host a solar system cost-effectively, without any new incentives, or any new programs. So why doesn't that happen? Well, our experience is that folks that are making the buying decisions don't understand that it's possible. They look at it a few years ago, they had a lot of unsolicited proposals or interest, and a lot of hype, and said, "This

is great around 2008" when it wasn't nearly as good as it is now, and a whole different framework for financing costs and everything else, and they said, "You know what? It doesn't work. So we're going to walk away." And that was it. And yet it does work today, with today's electricity prices, it's very competitive, there's money to be saved starting tomorrow. So when we're talking about job -- workforce development, we really need to focus on the buy side, because it's the folks that are making the decisions to push forward with these projects that are really taking the leadership -- you guys -- Kern County are a great example, you're familiar with the projects, you know what to do, you know how to bring the pieces together, and so you're getting the job done. Right? And so that could happen everywhere -- tomorrow. And that poll, our focus is on the poll, if you have the desire for projects that are cost-effective and you're tapping into the best practices, and the best technologies, and the appropriate mix of those for your particular region or need, whether it's energy efficiency, or solar, or wind, or biomass, or others, then those projects are going to happen, and that’s going to, of course, from the vendor community, are going to create the need to go hire the people and find them, put a website, if they're having a hard time finding people

that are qualified, they'll figure out a way to make it happen, there's no shortage of the ability of vendors who have an opportunity to sell their products and to do the work to find the supply chain and the people to make it happen. So if the policy here is all about R&D and push, let's get more new technologies, let's get more people trained, but there's not an even, at least, split to say, "How do we do the projects?" How do we get people comfortable with doing more of these projects? Then we're still always just going to be trying to push that, you know, rope up the hill, right, it's just not going to get there because all the capacity is locked in, and so how do we get that potential unlocked?

So I think having more support for the people that are making those buying decisions, whether on the financing groups, whether they're in the legal departments, whether they are in the facilities management folks, I mean, everybody in there can say no, and they don't know how to say yes because they're not familiar with it, they're not comfortable. And that's a really high leverage activity because each one of those people can make a decision that's responsible for hundreds of jobs, and all they have to do is say yes because they understand it, and that is a key that I think -- anything we can do to support that would be a

big help.

MR. RILLERA: Okay, thank you, Ben. Lew, I wasn't too sure --

MR. MILFORD: I think everything has pretty much been said, but I think that the -- what's interesting to me is that, you know, there's very little discussion about the auto mechanics and project finance, which is often what happens when you have a renewable discussion, and to me that says, you know, that the industry is maturing, the policy is maturing, and I think California is in the same boat as everybody else in the country, it has to figure out how to turn this industry into a serious economic development opportunity. And all these questions that are on the table, everyone is trying to figure those out, which is a good thing and a bad thing, we haven't figured it out yet, but on the other hand, I think it's a sign -- we've only been at this for about 15 years, 20 years maybe tops, 15, I mean, it's a very immature industry. You know, and we're up against industry that's 120 years old that has figured out how to finance their stuff, and I think capital is the name of the game, and I think it's scale and capital. And I'll go back just to the Bonding Authorities, the municipalities, you know, I think the challenge is to make this industry as boring as roads and bridges and

hospitals and schools, you know, you don't ask how you get those things financed, they just seem to happen magically, and they typically happen magically through infrastructure finance, local authorities, they know how to do this stuff. The good news is they want to do this, and so the challenge is to marry them up, at least that's one of the big challenges, I think. Thanks very much for doing this, this is a really good conversation.

MR. RILLERA: Thank you, Lewis.

COMMISSIONER PETERMAN: Thank you to all the panelists on this panel and all the panelists for the day. I mean, this has been a very interesting workshop and it's brought together a lot of the ideas and concepts that have been raised in the previous four and a half -- well, four now, not four and a half -- four workshops we've had and there's many comments I could make, but I'll just make a couple.

I think you have all raised really valid points and things that we're aware of and we just need to figure out how to move forward because I think that our policy does touch upon all the aspects you've identified: there's technology push, there's demand pull, there's workforce training, there's consumer adaptation, but ultimately there's -- the public funding available will never be sufficient to meet the entire need.

You know, I just take the example from our Transportation Program, the AB 118 Program, there were applications for $2.1 billion for $200 million over the course of a couple years, it's the biggest program of its type in the nation, but still less than Californians spend a day on gasoline. And so, when we're thinking about working, moving forward and reaching our goals, it ultimately is going to be about leveraging the various resources, the public resources, the private resources, and all of us not working within our silos; if you're someone who is a supplier of -- if you do job training, it's also important to do the marketing to get consumers interested in having the demand for the product; if you're someone who creates the product, liaising with the job trainers, because ultimately none of us will be successful in what we're trying to do if the other party is not, as well.

And a key thing that's come out, I think, throughout the day, has been diversity, the value of diversified resources. I come from a finance background and diversification is really how you deal with risk, it's a key element, and I think we need to keep that in mind ultimately, that that's what's going to help us reach our various goals. And we have a diversity of goals we're trying to reach.

I really appreciate the comment that was made about most of our programs were designed pre-2008, and if you look at the intent language in many of those programs, some of them have five to 10 pieces of intent, and jobs usually is not one of them. And so we are trying to reach greenhouse gas goals, energy security goals, reduction in petroleum dependency goals and, as we're trying to reach those, as Bill noted, it is important to think about how we can best take advantage of the opportunity we have in front of us.

And I think, considering jobs are important, quantifying the jobs we have now and seeing to the extent we can maximize those while reaching the goals that we've set out in these initial pieces of legislation.

And I think, going forward, there's a lot of work to be done if we're really serious about reducing greenhouse gases for 2050, there will be new programs, there will be new designs, and these are important things to consider at the onset versus after the fact.

So, again, I appreciate -- I think the representation we've had here today shows the opportunity for coordination and diversity; we have every sector you can imagine, we have the education sector, we have regulators here, we have economic development, we have Senate representation, we have industry, and we have

students, and so I encourage these conversations to continue.

And I also will ask that, when we develop the Renewable Strategic Plan, which is what these workshops are about, that you read it, that you pay attention to it, that you try to implement it, that you work with us on implementing it, because we're not doing all this work for our own sake, we want to do it because we really want to help us reach these 2020 goals.

And that's what the IEPR is about, generally. And we're focusing really this year on getting something that is smaller to read, but it's hard to condense all these ideas into a short document, which is why we had our initial report last summer, but that's a good resource -- take it, digest it, provide comments to us, we have this opportunity and this venue here to put information out into the public, and we take that seriously. But we really wanted to reflect what's actually happening on the ground and the experience that you're having because that will make it something that's ultimately very usable.

So with that, I encourage you to come to our next two workshops, and read the transcripts of all of them online, they've been quite informative for me.

Thank you to all the panel moderators for their

excellent moderation and, also, organizing behind the scenes. And of course, continued thanks to Heather Raitt who is our Renewables Lead in this area and Project Manager of the Strategic Plan, and Suzanne Korosec for her work on the IEPR.

And so, with that, only 19 minutes behind, we are adjourned. Have a good day, everyone.

[Adjourned at 5:15 P.M.]