MEETING

STATE OF CALIFORNIA

ENERGY COMMISSION

In the Matter of:	)	
	)	
Joint Workshops on the	)	Docket 12-EPIC-01
Proposed 2015-2017 Triennial	)	
Investment Plans for the	)	
Electric Program Investment	)	
Charge Program	)	

SOUTHERN CALIFORNIA EDISON

14799 CHESTNUT STREET

ROOM 110K

WESTMINSTER, CALIFORNIA

FRIDAY, MARCH 21, 2014

10:00 A.M.

Reported by:

Martha L. Nelson

APPEARANCES

ENERGY COMMISSION STAFF

Laurie ten Hope, Director of Research

Pam Doughman

Jamie Patterson

David Hungerford

Eric Stokes

Rizaldo Aldas

PRESENTERS

Amanda Moore, Pacific Gas and Electric Company

John Minnicucci, Southern California Edison Company

Percy Harlson, Southern California Edison Company

Suna Taymaz, Pacific Gas and Electric Company

Frank Goodman, San Diego Gas and Electric Company

ALSO PRESENT

Doug Kim, Southern California Edison Company

Marilyn Keller, Southern California Edison Company

Bill Lyte, Burns and McDonnell

Krista Kamer, CSU COAST

In S. Kim, ADC Energy

Kelly L. Hull, Bright Footprint

P R O C E E D I N G S

10:02 a.m.

PROCEEDINGS BEGIN AT 10:02 A.M.

(The meeting was called to order at 10:02 A.M.)

WESTMINSTER, CALIFORNIA, FRIDAY, MARCH 21, 2014

MEETING BEGINS AT 10:02 A.M.

MR. KIM: So my name is Doug Kim. I'm the Director of Advanced Technology for Southern California Edison. So on behalf of Edison I would like to welcome all of you, and those that are listening in, to this EPIC Workshop today.

You know, I think all of the folks that are participating here, we all know that there are a lot of federal and state policies that we're all trying to achieve. And we think that there are some really interesting and promising technologies and solutions that are emerging. And I think this is what it's all about, is trying to leverage those things to help us achieve those objectives. And I think it certainly is going to take a strong participating by all of the stakeholders. So I think opportunity like this is great for -- for the state and for all the -- the ratepayers that we serve.

So again, I think we are looking forward to having a really great conversation today. And we have a lot on the agenda, so let's get going. And welcome again. Thanks.

MS. KELLER: Good morning, everyone. It's great to see you today. I'm Marilyn Keller. I'm your cruise director today. I'll be your meeting manager. If there's anything that you need, please let me know.

We do not have wi-fi in this room. Just so you're aware, there is no wi-fi available in this room.

The first, of course, safety first. I want to make sure that you know the evacuation plan in the event of an unlikely emergency. We haven't had one yet. But, you know, we always want to be prepared. You would -- in the event of an earthquake you would want to stay in the room and duck under the tables in the back or down near your chairs. Do not move. Do not leave the room unless we tell you it's safe to leave. In the event of any other fire, whatever, any kind of emergency, you'll be instructed to leave the room, exit through that door right there behind Ross. Even though it says "Stop," just keep right on going and head out the door into the parking lot. And you will see a number three on one of the trees at the far end of the parking lot.

Has everyone signed in today so we know that you're here? If not, we want to please make sure you stop by the front desk and put down your cell phone number, because we want to know you're here and find you in the event of an emergency.

Please put your cell phones on silent or vibrate so that they don't ring during the meeting. That would be appreciated.

Also, directly outside this room on the other side of this wall are the restrooms. They're -- they're small single restrooms, but they're right outside the room.

We ask that you don't wander off anywhere in the building. We need to -- everyone needs to be within this room or on the outside of the door. If you do need to go outside for any reason, to take a call or whatever, the guard will -- at the door will let you back in. That's what she's here for, to help you out.

If there's anything I can do for you to make this meeting more comfortable and productive for you, please let me know and I'll be happy to accommodate.

And so hope you enjoy your meeting. I'm going to turn it over to the CEC now.

MS. DOUGHMAN: Would the CEC staff please come to the front table? Thank you.

So the agenda for today, unfortunately, Damon Franz will not be able to join us from the CPUC, but his presentation is online. And Laurie ten Hope will go over some of the key points. And thank you to Doug Kim for the welcome. We will now go into a presentation from Laurie ten Hope and other staff from the Energy Commission. They will

provide an overview of the proposed initiatives for the Energy Commission's 2015-2017 Proposed Investment Plan for EPIC. Then we will have public comment. And then we will break for lunch. After lunch we will have a similar sequence from the investor-owned utilities. Thank you.

MS. TEN HOPE: Okay. I'm Laurie ten Hope. I'm the Director of Research at the California Energy Commission. And this is basically the same format and presentation that was provided in Sacramento on -- is there a way to not listen to everybody coming on? Anyway, this is basically the same presentation that was provided in Northern California on Monday. So it's providing another opportunity for our Southern California stakeholders to participate in person.

So I'm basically with Damon Franz not being here, I'm going to just read a couple of the points from the PowerPoint presentation that he provided on Monday. He's the -- the staff lead for the public -- the Electric Program Investment Charge with the California Public Utilities Commission.

So in his presentation he provided background that EPIC is designed to assist in the development of non-commercialized new and emerging clean energy technologies in California while providing assistance to commercially viable projects. The CPUC found that each of the first Triennial

Investment Plans offered a reasonable probability of providing electricity ratepayer benefits by providing greater reliability, lower costs, and increased safety. The projects selected for award for EPIC should be funded on a competitive basis, unless the administrators have specifically detailed and justified exceptions to this in their approved investment plan. And the EPIC administrators are required to report the use of non-competitive rewards in their annual reports to the Public Utilities Commission.

The CPUC approved the 2012-2104 Investment Plan in November of 2013. And it basically laid out a plan for $162 million a year over the three-year period with the Energy Commission administering $127 million, and the three investor-owned utilities administering $33 million. And the technology areas are diversified between the administrators. The Energy Commission is providing research in a broad portfolio across multiple topic areas that are designed to provide benefits to ratepayers in energy efficiency, generation, clean electric transportation, and smart grid technologies. The utilities are focused on -- on the technology demonstration portion of the portfolio.

The EPIC Program is now live. On November 1st, 2012 each of the program administrators submitted their respective investment plans to the CPUC for consideration. The investment plans were modified and approved on November

14th. The administrators will now hold competitive solicitations and grant awards to successful bidders. And the CPUC will continue to oversee the implementation of the EPIC Program.

So additionally, each of the administrators is required to file annual reports to the CPUC on February 28th. And they will -- the CPUC will hire an independent evaluator to review the program by 2016.

Each of the administrators have a public website. And Damon was kind enough to provide his contact information. If any of you have questions for the CPUC you can reach Damon at Damon, D-a-m-o-n, dot Franz, F-r-a-n-z, at cpuc.ca.gov. And his phone number is (415) 703-2165. And again, this presentation is on the web.

So now I will speak for myself and introduce the -- the Energy Commission's portfolio here. So basically that was principally the background on the development of the first investment plan. And we're here today to -- to develop the second investment plan for EPIC which is going to cover the periods of 2015, 2016 and 2017. And so we're very interested in your participation today in the workshop, as well as we'll provide opportunities for -- for public comment.

So in -- we're on slide two. In developing the initiatives you're going to hear today the Energy Commission

took -- took a step back to base the initiatives in this plan based on new statute. We have guidance from SB 96 which provides some priority initiative areas that the program should focus on. And those include renewable integration, storage, electrification of transportation, energy efficiency, and renewables. Those are the topic areas specified in SB 96. And then we are encouraged to look at additional areas if significant barriers exist for the achievement of clean energy goals in California.

We've also received a lot of stakeholder comments, over 100 sets of comments so far from earlier workshops. We've done an assessment of the current state of the art of technologies and sort of where -- where we think we'll be at the conclusion of the first investment plan, and key factors that are driving clean energy development including policy goals like the new storage procurement goals, electrification goals, ZNE goals for 2020 and 2030.

The proposed initiatives incorporate the CPUC guidance. And a couple of things that are important in the CPUC's decision are guiding principles that the initiatives need to return value to the ratepayers that are supporting these funds. And that the initiatives basically need to tie back to the electricity system referred to in the decision as the electricity value chain. And, of course, we're looking for proposed projects that we think are going to

provide the highest value proposition for ratepayers.

So I just want to give a couple of examples of what's different in the second investment plan from the first investment plan. In applying these principles we -- we've changed focus in some cases. For example, in the first investment plan we have a strong focus on energy efficiency and buildings, particularly earlier in looking for technology innovation that's more at the lab scale and the kinds of efficiency, demand response, storage, etcetera, technologies that will help us get to super energy efficient existing buildings, and also to near or total zero net energy buildings by 2020 for residential and 2030 for commercial.

By the second investment plan we want to take some of that research and focus on larger scale deployments where we're really looking at more the demonstration scale at either a developer scale, a subdivision scale on helping reduce some of the risk but do a larger deployment.

In the -- one of the new things in the energy efficiency area, as well, is that we're exploring concepts like golden carrot where we might give more of a prize for -- for achieving particular performance targets. And we're exploring this both in -- in the ZNE area, as well as the appliance area in perhaps consumer electronics set-top boxes.

Another example, in the industrial, ag and water our philosophy is a little bit reversed. In the EPIC Program and in the Energy Commission research programs that were administered prior to EPIC we have really focused on demonstrations in the industrial, ag and water. And we have done four -- four separate series of grants to -- to the industrial sector to improve processes. And these have been, you know, these have been really successful and have some, you know, really interesting projects. But this time we want to really step back and look for more enabling technology, more breakthrough type technologies that we could then bring back into the demonstration arena in a future cycle.

I, basically in the last slide, discussed both the -- the new strategy in the applied research, as well as the technology, demonstration and deployment area. So I'm going to move to slide five. And this is -- market facilitation is the area that we are proposing more significant changes in the second investment plan. The -- I probably didn't set this up properly. The EPIC investment -- the EPIC strategy really encourages the administrators to develop technologies from -- from early on in applied research, then in technology demonstrations, and then a small market facilitation program to -- to help bring selected technologies over the commercialization valley or

death.

And so this -- in the first investment plan we proposed and are implementing a couple of targeted areas in the clean energy workforce and permit assistance for local governments to help with the permitting, most prominently, renewables. They have jurisdiction for a lo to the renewable development and may not have the same expertise for -- for that task. This time we've taken a much more holisitic approach to look at the types of strategies, a broader portfolio of strategies that would help accelerate emerging technologies get to market. And this -- this, I think, is really an exciting area, and also important to target because commercialization can be -- is -- is the most expensive part, so our assistance really needs to be strategic. And you'll hear from Eric and Pam later today about some of those ideas around procurement and testing protocols. And this area -- we're interested in your comments in all areas, particularly in this area that -- that is -- that's new that you tell us whether you think these are -- are the areas that show the most promise.

We're also, in our draft at this point, keeping an option open for New Solar Homes Partnership funding. This -- this is an area that the Energy Commission is exploring various potential funding sources to continue the incentive payments for -- for solar -- for PV on -- on

homes.

With that, we're -- we're going to transition to hearing from our staff. And what we're -- what we're going to do for about the next hour is to really walk through, at a high level, our draft proposals at this point for initiatives in the -- in the next investment plan. These the -- the PowerPoints are online. They're in the back of the room. And by the end of today we'll have some backup materials for the workshop. We'll have descriptions of each of these initiatives on our website. Because we're -- we're opening up a comment period, we would ask for your comments on initiatives by the 28th, next Friday, the 28th of this month. And I'm going to just read the questions to you so as you're listening to each of our speakers, you know, your -- the questions will be keyed up in your mind.

So we're really interested in are we missing some key initiatives? Are there some key technology opportunities or -- or strategies to accelerate technology development that's missing? And on the other hand, we also want to be strategic. So if you see some of these things and say, oh, well, that's, you know, that's needed but it's -- it's probably a low priority given funding that other people are providing or its potential benefits are -- are, you know, are relatively small. We also are interested in culling some of the initiatives. We're also looking at

potential flagship programs that may -- may -- we may dedicate more than the typical, you know, 1 to 2 million type award that, you know, really has the potential for significant cost reduction savings or other benefits. And are there initiatives that should be combined? So those are the questions.

We're going to start with applied research. There are 11 strategies in this area, basically two strategies in energy efficiency, three strategies in the clean generation area, followed by several in the smart grid area, and then two crosscutting areas. So I'm going to turn this to Dave Hungerford who is our lead for some of the building energy efficiency, especially demand response and behavioral research. And he'll walk us through the energy efficiency initiatives.

MR. HUNGERFORD: Thank you, Laurie. Have I got this close enough? Okay. Okay. Under the first -- under the first strategic objective our purpose is to build on our past investments and energy efficient technologies and identify promising new technologies with the potential to produce energy consumption in the building, agricultural, and water sectors. The first initiative under this is to -- is to look at efficient solutions and lower energy consumption buildings. We're going to continue investing in advanced devices and systems to improve building performance

with consideration for reducing costs, facilitating consumer adoption, and informing future codes and standards efforts.

There will be five specific research areas that we'll be looking at, five technology areas. The first is lighting and lighting control technology, lighting systems. The second is heating, ventilation and air conditioning systems. The third is looking for improvements in building envelope. The fourth is to address the problems of the proliferation of small devices that we term plug load devices, things that are plugged into the wall, and we're going to look at improving efficiencies there. And we're also looking, in support of AB 758, improving retrofit strategies for energy efficiency in existing buildings, what are the best -- what is the most ripe areas for gaining additional savings?

The second initiative, the idea of getting to the level of efficiency necessary to achieve the zero net energy goals are going to require an integrated approach to building design, and they're going to have meet three critical criteria, builder support and cooperation, consumer acceptance, and cost -- costs that are really comparable to current construction practices, and that presents a challenge. So we're going to look at two research areas under this.

The first is to develop and test standardized

prescriptive design packages for zero net energy residential, multi-family, and commercial buildings to make it easier for builders to be able to -- to meet the zero net energy goals.

The second is to create a design optimization competition -- one of the golden carrots Laurie mentioned -- for zero net energy residential, commercial, multi-family, and low-income buildings and communities.

The third initiative -- the third initiative, one of the major challenges to -- to achieving efficient outcomes is that people don’t necessarily use devices the way engineers intend, nor do engineers necessarily consider how devices are used in the real world when pursuing more efficient designs. So this research area is to -- is to apply advanced social science research methods to improve energy efficiency technology development and to empirically determine such things as how people will respond to and engage with new building designs and systems, how people will adapt their lifestyles to new technologies and new kinds of buildings, and three, how people will best respond opportunities to retrofit existing buildings; how do you get people to cooperate, how do you get people to make those investments?

The three focused research areas, first is retrofitting buildings. We want to look at best practices

for contractors in a comparative analysis of emerging contractor business models to identify business models that will align with the fundamental policy goals of diagnosing building and efficiency and providing customers reasonable options for -- options for fixing those problems.

The second is consumer acceptance. We're going to address the fundamental issue of consumer acceptance at adoption of emerging technologies by exploring ways in which the technology research and development process can include social science research components that anticipate end-user needs, end-user expectations, and they're understandings and capabilities for using those technologies.

The third is focusing back on zero net energy buildings. We need to develop an empirically based understanding of both the development process and the real-world operations of new zero net energy buildings. That -- that will necessarily involve, as we start building, as these buildings start -- start growing, getting built, we need to look at both how people live in those buildings. We need to collect data from building occupants. And we also need to look at the development process and the building process, looking at the people -- collecting data from the people involved in developing, designing, and building new buildings so that we can respond and make improvements to make the -- to get this to work and achieve those goals of

lower cost and consumer acceptance.

The fourth initiative has to do with indoor air quality. Necessarily, buildings are getting tighter and less -- less air exchange. And as they get tighter, previously minor sources of indoor pollution are of increasing concern. And so the first -- we have two research areas in this -- in this initiative. The first is developing and demonstrating metrics for tracking and comparing indoor air quality in buildings to account for new and more -- more diverse sources of indoor air pollution. The second is to develop approaches to improving indoor air quality by considering both technological solutions and occupant behavior.

The fifth initiative is to develop and validate and document energy savings technologies that are in the research and early development stages in industrial, ag, and water and wastewater plant settings. There are four large areas that we’re going to be looking at under this initiative.

The first is with -- is for the industrial and agricultural sectors. We’re going to focus on process improvements for energy efficient -- energy intensive industries, and development of technologies that substitute of materially change underlying processes.

The second area is in the water and wastewater

sectors. And there's going to be a substantial effort under -- you know, for those -- for that sector. The first will be to continue investments in membrane filtration technologies. The second is to follow some of these newer technologies as they're getting installed, collect new data from new and existing facilities to develop reliable estimates of savings potential and costs of alternative water -- water disinfection systems. The third is to evaluate existing installations of water reuse technologies to better understand the potential of water reuse to save water and energy. And the fourth area under water and wastewater sectors is to identify potential efficiencies in moving water around in water and wastewater facilities to try to squeeze some more efficiency out of the pumping and moving of water in those -- in those systems.

The third major area under this initiative is to identify opportunities to operate equipment or alter processes to provide load reduction on demand, basically demand response throughout these -- throughout these sectors.

The fourth major area is to identify research priorities, additional research priorities by engaging experts through workshops and technical advisory meetings.

Moving on to the next, the sixth initiative, here the -- here the goal is to promote water and energy

efficiency in residential and commercial buildings; three research areas compose this. The first is to increase efficiency of end-use devices. The second is to increase substitution of gray and stormwater for landscaping and other purposes. And the fourth is to identify leakage and waste through the use of smart meter -- smart meter technologies and controls.

The second strategic -- strategic objective I'm going to be talking about is looking at customer-side-of-the-meter energy choices. The second investment plan is going to focus on developing and testing and demonstrating demand response technology and operational capabilities in the following areas: First, constructing performance data sets needed for demand response to compete with generation as a resource; the second is providing technical and operational data to support new programs and market products that take advantage of DR capabilities; and the third is to improve the capability to forecast demand response performance so that system operators can -- can utilize the resource with confidence.

The focused initiative under this -- under this strategic objective is to increase the potential for DR to displace fossil generation while maintaining grid reliability and integrating intermittent and highly variable renewable resources. We have three focused research areas

under this. The first is to develop and test advanced demand response technologies. The second is to develop and evaluate control and monitoring hardware and software systems to provide enhanced, highly reliable DR and storage that -- and that will feed into the forecasting process. And the third is to assemble and evaluate performance data to build a data -- sufficient database of DR performance data to be able to make reliable estimates of performance from different end uses and customer types under different conditions.

And that covers what I'm going to talk about. We're moving on to --

MS. TEN HOPE: Rizaldo.

MR. ALDAS: Hi. Good morning. My name is Rizaldo Aldas. I'm here for renewable energy and advanced generation. I will be presenting the clean generation clusters of strategic objectives and initiatives.

And starting with strategic objective number three, these objectives -- objective three is to help increase the market penetration of distributed renewable and advanced generation by helping develop innovative solutions. Everyone knows the benefits of distributed generation related with reductions and the need for transmission. For example, addressing the load requirement to meet the user side. And it is one of the goals that's specified under

the, for example, the Clean Energy Jobs Plan, as well as the RRPS. There are several forms of distributed generation. Some of the common barriers for these include the high overall cost, depending on the technology in terms of efficiency and reliability. Permitting interconnection also can be challenging for distributed generations. So we would like to continue addressing those issues.

And in this case we have five initiatives proposed under this. The first three are what I call addressing the core renewables. And the last two are addressing the needs for emerging and advanced generation.

For the first initiative under this objective number three, this is to help develop and demonstrate the early-stage innovative technologies and techniques and deployment associated with the biosmass-to-energy systems with the aim of helping improve or lower the cost, making the systems more efficient and sustainable. California has an abundant source of biomass, and there are a lot of benefits and co-benefits, for instance, in the forest area, helping address the wildfire issues or helping addressing the current state target of using the materials that goes in the landfill.

And so we would like to address several areas here. For example, advancing biomass-to-energy conversion technologies, looking at several systems from high

temperature to anaerobic digestion. And we will emphasize establishing evaluating the performance of the system. So in the process we will set some performance goals and helping and conducting research that will help achieve those performance goals. We will look at applying these technologies in several areas where biomass resource are located with the aim of achieving cost parity with fossil fuel generation, for example, and looking at the areas of sustainable biomass harvesting, processing and handling systems.

The second initiative is on developing integrated and hybrid photovoltaic technologies and strategies to reduce cost in advanced zero net energy buildings. In the first EPIC Investment Plan we looked at distributed solar PV, addressing certain technologies, for instance, the smart inverters. In this second investment plan we are looking at other areas. And we will focus more on the technology development side with some specific focus on, for example, hybrid EV terminal technologies.

We will help -- we will support research that will develop distributed PV technologies and strategies to increase overall conversion efficiencies, facilitate the adoption of building integrated PV and hybrid PV terminal systems. We will support the development and evaluation of comprehensive approaches to reduce the cost of PV. And we

will look at investigating strategies and business models to ensure that commercial PV systems are readily available and provide the functionality needed for customers. There are some advantages made on these projects, but further cost reductions and opportunities exist that are essential for a long-term viability of distributed PV in California.

For the third initiatives under objective three we are supporting -- we will be conducting research related with in-conduit hydropower. In-conduit hydropower is where electricity is generated by using the force of moving water in open channels, canals, and can do this without the need for large dams or reservoirs. There are several studies supporting the potentials for this area. For example, the Energy Commission studies showed an estimated 215 megawatt for systems with 9 feet or more in terms of the channel drops. And there’s larger potential or greater opportunities by replacing pressure valves in pressurized water or wastewater conveyance pipelines.

But there is -- you can see some barriers in this area. Some of those are associated with technology, as well as permitting requirements, and the lack of standard testing protocols. So in this initiative we would like to research the development of tools, strategies and technologies to advance the commercial development and demonstration of in-conduit hydropower, turbines and generators, and address the

development of testing protocols or procedures for evaluating this new technology.

The fourth initiative, as well as the fifth initiative, is related with the breakthrough technology and advanced generation. In the fourth initiative, in particular, we are supporting the advancement of breakthrough technologies by developing early-stage innovative electricity generation technologies and other applications with potential to dramatically increase, for example, efficiency, dramatically reduce the cost. We will target technology that can help expand the use of renewable and advanced generation.

There are several areas, several research areas that could be addressed under this initiative. Some of the examples would include novel technological solutions to enable and increase the deployment and advanced distributed generation, looking at designs, new materials or new systems that have potential to reduce the cost, improve the durability and increase the reliability of renewable and advanced generation. We can look at system design, for example, for turbines or PV cell that will enable the better integration of this system and address some user examples, for example, better response to load changes and ramping requirements.

The initiative will support further bench-scale to

pilot-scale verification of new and advanced generation technologies such as integration of multiple existing materials in a single high efficient renewable system or high efficient waste heat conversion technologies to augment electricity augmentation. Those are just some of the areas that can be addressed under the breakthrough initiative.

The fifth initiative is more focused on a particular new and advanced technology, which is on the piezoelectric materials. Piezoelectric materials are those that can generate electricity with the application of stress. It's somewhat analogous to photovoltaic semiconductor in that it convert electricity with the application applied, or the thermoelectric, for example, that generate electricity with application of heat.

The Energy Commission supported a study evaluating, assessing the potentials of piezoelectric material. The results showed low level cost of electricity ranging from 8 cents to 80 cents, for example, but recommend further -- further effort to verify, for example, the quality of power, address durability, as well as the operational requirement. So that particular area will be supported under this initiative. We will take advantage of that development and availability of existing wasted mechanical energy to expand the generation. We are looking at potentials from our roadway surfaces, for example, train

tracks, building materials and other underutilized applications.

Next slide please. For strategic objective number four, this is focused on -- in the area of existing and emerging utility scale renewable energy generation. And the aim here is to help further improve the power plant performance, reduce the cost, and help accelerate the market acceptance of that particular technology. Utility scale clean energy generation is defined as a stand-alone generation facility that is directly connected to the grid. It could come in different sizes. We look at 20 megawatt as one of the benchmarks. It is important in terms of achieving some of the state goals such as the governor's Clean Energy Job Plan, the RRPS. There are several forms of utility scale systems. There are existing needs or challenges right now. For example, the need to improve the costs, improve the performance of existing systems possibly by developing new cost effective enabling technologies and strategies.

We have four proposed initiatives under objective four addressing the needs for solar energy, forecasting geothermal and wind energy. For the first initiative, this is helping with the concentrated solar power, looking at the ways to reduce the cost and increase the performance. The concentrating solar power was addressed in the first

investment plan. In the first plan we looked at the area of heat transfer fluids and thermal energy storage. In the second one we would like to look more on the other areas, other important areas, primarily the reflectors and receivers.

We know that CSP technologies, they come in different system configurations. They use different designs of mirrors or reflectors and receivers or absorbers to concentrate sunlight to heat the fluid and produce steam that drives a turbine. So we would like to address that particular part of the system.

So some of the potential projects here may be looking at improving the solar transmissivity of the mirrors, again, to reduce the levelized cost, maybe developing lighter weight reflective surface to reduce the manufacturing cost, or developing a reflective coating to reduce maintenance costs, and improving reflectivity assessments to improve, again, looking at improving performance, maintenance, as well as a reduction in cost.

For the second initiative under objective four, this is focused on increasing the productivity and reliability of wind and solar generation. The initiative will support research solutions to improving renewable energy integration into the state’s electrical grid through developing forecasting and modeling tools for wind and solar

generation. Under this research initiative we will develop and evaluate improved forecasting techniques and tools to inform the grid operators of expected wind and solar power plant performance, say on a minutes-ahead, hours-ahead, and days-ahead size scale series.

We have several -- we have a few research that we have started under the previous program, as well as we have addressed this -- some research associated with forecasting in the first investment plan. And we would like -- in the second -- in the second investment plan we will leverage those efforts. We will use some of the results to further advance the accuracy of solar and wind generation forecasts.

For the third initiative under objective four, this is geared at improving the cost effectiveness of geothermal energy production by developing advanced technologies and strategies associated with that. In the first EPIC Investment Plan we looked at researching a wide scope of geothermal development from reservoir exploration and characterization to the power plants.

For the second initiative our emphasis is on helping our existing facilities, for example, by improving the performance of existing plants and addressing the topics from improved reservoir management, plant operation, to assess the value of the -- to the grid of geothermal generation, including possible support to ancillary

services. So maintaining reservoir productivity is a priority here. We will research on the refinements to the technologies and modeling tools. We will look at improving power plant efficiency, possibly looking at materials and component designs, as well as grid support and looking at possibility of integrating thermal energy storage, all geared at, again, helping the existing facilities.

For the fourth initiative under objective four, this is looking at helping our aging wind resources in California, so developing and design cost and development improvements that would help that. So the initiative will support anything that we did not include in the first investment plan. But we will address the technology associated with the current -- most of the current wind facilities. Much of our best wind resource (inaudible) agedly. Wind turbines are past their designed economic life of 20 years. But at the same time we now have modern turbines that are more efficient at converting wind energy to electricity, that can provide incentives such as producing more revenue from electricity and other ancillary benefits.

So for this strategy we would like to help improve the system performance of that -- in that resource area, while addressing some of the potential barriers, regulatory as well as technology and possibly social adverse

environmental barriers associated with the wind repowering.

I am moving on to strategic objective number five. This objective is under the Energy Related Environmental Research Program. And the aim here is to help reduce the environmental and public health impacts of electricity generation and make the system less vulnerable to climate change. The emphasis of the program is to support developing science and innovation, which is also the overall primary focus of that program.

There are several studies, developments that are driving the research to -- on this one. For instance, the deployment of new technologies can have new impacts that are not well studies. There is an insufficient range of comprehensive assessments of impacts of clean generation technology. There are also results that shows that our current electricity system will become highly vulnerable to climate change and extreme events, while at the same time proving that electricity system can offer the opportunity to address or reduce that vulnerability.

So under this objective five we will have five initiatives. The first one will implement the roadmap to address the public health effects on energy technologies. So under EPIC 1 we are developing a detailed roadmap of research on potential public health implications of the new energy technologies. So it is envisioned that under the

second investment plan we will be able to implement the key topics identified in that roadmap. We will be able to implement some of the issues, unresolved issues such as exploring -- issues explored in prior studies under the first EPIC investment period will be analyzed. An example is that the atmospheric transformation and fate of extremely small particulars that are emitted from a power plant, as an example.

The second initiative under objective five will be developing environmental tools and information for future renewable energy conservation plans. One of the primary drivers here is the air scoping plan, for example, for future determination of post-2020 greenhouse gas reduction targets. The generation of electricity from renewable sources of energy with zero or close to zero greenhouse gas emissions are needed, both for the 2020 and potential post-2020 greenhouse gas targets.

So under this initiatives we plan to develop some of the environmental tools and information that will be needed for future renewable energy conversation plans. Example for this is the DRECP or Desert Renewable Energy Conservation Plan.

The third initiative in objective five will help improve the science for water management in power generation, particularly hydropower forecasting and hybrid

cooling towers. This initiative involves research that will assist with improvements in the way that we manage water for electricity generation. For example, hydrologic forecasts can be off by up to 40 percent because little is known about the actual amount of water, say contained in the snow pack in the high elevations in the Sierra Nevada. But we now have tools available. We have sensors that can be deployed that can be used to measure the snow pack in remote areas. And using that information, it can help substantially improve the forecast, allowing electric utilities then to increase their revenue in the end following their -- from their hydropower units.

We know that with increasing temperatures due to climate change the demand for water for cooling will increase, and the performance of dry-cooling units will also decrease. So this particular issue will address that issue. It will investigate the use of hybrid units. It will investigate other alternatives for the water requirement for cooling towers and look at the environmental, as well as emission issues associated with that.

For the fourth initiative, this will be for providing tools and information for regional climate change adaptation measures for the electricity sector. And the initiative will leverage several climate change status and statewide adaptation recommendations. But the primary focus

here will be on the local-regional level, to provide the tools and information that are needed to implement adaptation measures for the electricity sector. The initiative will examine the potential effects of a changing climate on wind and solar availability and other parameters to determine the potential impacts on renewable sources of electricity.

And lastly, for initiative number five under this objective, objective number five, we would like to provide seed funding for innovative energy related environmental research. And as we found in the past, we find that programs designed this way are excellent opportunities to discover unconventional ideas that can revolutionize a given area of work. And that's for the objective five. Thank you.

MS. TEN HOPE: Thanks, Rizaldo. So we'll turn to Jamie.

MR. PATTERSON: Hello. I'm Jamie Patterson. I'm a Senior Electrical Engineer in Research and Development.

Now we're on slide 13, strategic objective number six. And our objective here is to advance the use of smart inverter for grid support in California, our initiative. To achieve that objective is to develop smart inverter capability that will improve grid operations. Advanced smart inverters offer the solution to the challenges of high

penetrations of renewables. They can increase the penetration of photovoltaics and provide grid benefits.

This initiative will move inverter capability beyond California's Rule 21 and IEEE 1547(a) regs to those of IEEE 1547.8, to provide benefit for long feeder lines with voltage and reactive power problems, as well as helping neighborhoods with high penetrations of solar, or features that allow inverters to ride through voltage sags and surges, while also going offline for anti-islanding purposes will be most beneficial. Research for expanding the communication capabilities of smart inverters is also included in this initiative.

Okay, let's move on to slide 14. We have strategic objective number seven. Our objective here, to develop advanced distribution modeling tools for the future of the smart grid. And our initiative to achieve that objective is to develop open-source electricity system modeling tools to visualize California's modern distribution systems. The purpose of this initiative is to develop modules for existing open-source modeling tools for use by the utilities and the California Independent System Operator. These modules are needed to visualize the dynamic operation of the distribution system. Current tools can only provide a snapshot of the grid, while the new tools will allow utilities and the California Independent System

Operator to analyze the interactions of smart grid equipments in a more real-time manner. These tools will include smart grid elements and be capable of simulating the operation of California's future smart distribution system.

Okay, slide 15 please. Here we are. We are on strategic objective number eight. Our objective here is to advance customer systems to coordinate with utility communications. Our initiative to achieving that objective is to develop customer systems to manage demand response, renewables, and electric vehicles and integrate these tools with the grid.

On the customer side of the meter the networks of customer equipments for demand response, electric vehicles, and smart inverters in renewable generation equipment lacks a central energy management system. This makes them unable to coordinate with each other to provide a single customer premise response to the utility and to maximize their combined benefit to the customer. This initiative will develop customer energy management systems to coordinate the various energy devices in a customer's premises network and communicate a system response to the utility grid side to help with distribution operations. These management systems will also enable coordination of generation and load to maximize their benefits to the customer. Thank you.

MS. TEN HOPE: Thanks, Jamie. We'll return to

Rizaldo.

MR. ALDAS: Thank you. The next strategic objective, objective number nine, is under the transportation research area. And it's emphasis is on plug-in electric vehicles and its efficient integration to the electricity system. Plug-in electric vehicles, or PEVs, and combining electric transportation technologies offer a promising and potentially revolutionary alternative for meeting the state's transportation needs. PEVs can provide a number of benefits to the electricity grid when integrated with smart charging technologies and other strategies. But research is needed to determine how PEVs can effectively be integrated into the electricity grid to minimize the carbon footprint, and which technologies continue to advance the capabilities of PEVs.

The strategic objective nine is supporting two key planning documents. It supports the strategies identified in the 2013 Zero Emission Vehicle Action Plan. That action plan was released as a result of the governor's executive order in 2012 establishing a goal of 1.5 zero-emission vehicles by 2025. The other planning document is on the Vehicle Grid Integration Roadmap. This roadmap maps a way to develop solutions that enable electric vehicles to provide grid services while still meeting consumer driving needs. And that Vehicle Grid Integration Roadmap also

supports the ZEV Action Plan.

For this particular objective we have three initiatives that are proposed. The topics are on PEV, vehicle grid integration, and battery recycle. The -- with the exception of the battery recycle the two initiatives were not included in the first EPIC Investment Plan. It's new for the second investment. However, we have studies supporting the prior program, and we are going to leverage the results of that finding into this second investment plan.

The first initiative under objective number nine is to advance the electric vehicle charging and grid services to maximize renewable resources and improve grid flexibility. This initiative will develop advanced methods of smart and efficient charging for plug-in electric vehicles. It will look at opportunities to utilize the distributed battery capacity of an electric vehicle fleet as grid-to-storage and create opportunities for rapid response and operational flexibility to provide regulation and load following capabilities, and help mitigate some of the intermittent issues associated with renewable generation and allow for higher mix of renewable resources such as wind and solar into the grid.

The second initiative is on advancing the development of vehicle grid integration technologies and

methods into residential and private or public fleet applications. This initiative is building on the previous VGI or vehicle grid integration projects that is developing the communication and protocols to enable bidirectional power flow, to perform vehicle-to-grid and vehicle-to-building strategies.

The initiative will further advance the development of these technologies and methods by going beyond the military bases and government fleets and expanding to the residential and private or public fleet applications. It will leverage some of the findings or results from ongoing Department of Defense military installations, VGI projects, including continuing to determine cost benefits of VGI through demand response or load shifting, determining impacts that VGI may have on the PEV batteries.

And some of the examples of the topics that may be supported under this initiative include understanding vehicle use profiles, electric vehicle cost benefits, battery life challenges with VGI under residential and private or public fleet applications, assessing VGI gridding packs for different applications and technologies, and developing VGI business models for residential and private and public fleet applications.

The third initiative under objective nine is to

further develop and evaluate advanced technologies and methods for safe and efficient recycling of PEV batteries. As the number of electric vehicles in California transportation grows it is essential that efficient, safe, environmental sound, and cost effective recycling systems be developed for recycling a large form of lithium batteries. It is known that lithium batteries can be recycled. However, the cost of doing that is too expensive. So we were looking at the ways of addressing that issue.

The initiative will develop existing battery recycling strategies, pursue projects that can fill research gaps, as well as advance existing merits for battery production and recycling. We will research battery disposal impacts, advance tools and methods necessary for larger scale battery pack recycling and recycling efficiency. Thank you.

MS. TEN HOPE: Thanks Rizaldo. Eric?

MR. STOKES: So this is Eric Stokes. I'll be presenting the crosscutting -- get this closer -- the crosscutting elements for the applied research and development section. We have two strategies under crosscutting. The first strategy aims to advance the early development of breakthrough energy concepts. And under this strategy we have two proposed initiative.

The first will provide seed-stage funding for

disruptive energy technologies. One of the challenges with technologies, it's often hard to predict what those next generation of ideas are going to be. And this initiative really aims to address that space and fill a gap where a researcher, they have a concept that shows some potential promise but they need a little bit of funding to be able to prove it out and determine whether that concept is feasible so they can go market to potential investors, as well as apply for follow-up funding to scale up their innovation.

The next initiative under this strategy will conduct incentive-based competitions to foster breakthrough ideas for clean energy solutions, particularly in those markets where we haven't seen the technical or market advancements that we had hoped for in moving these -- some of these concepts forward. These types of competitions offer a lot of benefits. One of those is they offer up some of the challenges the industry is facing to a broader set of innovators and encourages not only greater competition, but also collaboration and integration of ideas in a manner that really results in possibly some more comprehensive solutions. I think most people's familiarity with these types of prizes is the X Prize Foundation. But even DARPA is using these as a tool to really try and foster some breakthrough ideas in moving some of their technologies forward.

Okay, next slide. The next slide under this strategy, it's pretty straight forward, one of the benefits with EPIC is possibly using funding from the program to leverage large amounts of federal dollars. And under this initiative, we had a similar one in the first plan, potential applicants to federal awards could apply for EPIC funding. And if they receive the federal award EPIC funds would be used as part of the cost share. Most typical federal awards require a minimum amount of cost share.

MS. TEN HOPE: Okay. Now we've -- we've covered the staff proposals in the applied research area. These initiatives are really all designed to continue to provide a stream of technological solutions that provide customers cleaner, cheaper, more reliable, and environmental benign technology solutions. In the applied research, this is the -- the building blocks for the next area we're going to hear from, which is the technology demonstration area. And in technology demonstration and deployment we have six objectives. And they'll, again, span the range that you just heard in terms of energy efficiency, generation, smart grid, clean transportation, and crosscutting.

So we'll first start with energy efficiency. And back to Dave to present the efficiency and demand response initiatives.

` MR. HUNGERFORD: All right. Under the first

objective the -- for this new investment plan the focus is going to be primarily on demonstrations in the building sector with an emphasis on technologies that were investigated in the first investment plan, on a large scale, deployment.

The first initiative under this objective, the purpose is to produce independent technical and economic performance data on promising efficiency and demand response technologies to document savings and performance. The -- further, this initiative is going to build on previous work in the State Partnership for Energy Efficiency Demonstrations, the SPEED program, which focused on technology demonstrations and deployments in the University of California and other governmental buildings. This time this initiative is going to expand on -- expand that work to additional sectors.

The second initiative under this objective will focus on demonstrations and large scale deployment of emerging integrated demand-side managements and other smart technologies. There are three focused research areas under this.

The first is to demonstrate and deploy an integrated suite of emerging demand-side management technologies including energy efficiency, demand response, and other smart technologies such as energy management

systems. The second is to demonstrate and deploy integrated zero net energy turnkey package designs in multiple -- in multiple residential, multi-family, and commercial developments. The third is to integrate social science behavioral research, as we discussed earlier, into the development and implementation phases of the demonstrations to make sure that the demonstration designs consider the fact that people will have to live in and operate the buildings.

MS. TEN HOPE: Thank you. Rizaldo?

MR. ALDAS: Thank you. The strategic objective number 13 is focused on field demonstration, deployment, and evaluation of biomass-to-energy conversion systems, tools and strategies that will help accelerate the deployment of such system. So for this strategic objective we will support the further advancement of early deployment of that bioenergy technology to help realize the full benefits from our abundant biomass and organic waste resources. The strategic objective is aligned with a number of goals called for in some of the policy documents. For instance, the Integrated Energy Policy Report and the Bioenergy Action Plan, as well as the SB 1122 being developed at the CPUC, these -- SB 1122 requires an incremental of 250 megawatt of renewable (inaudible) procurement from small-scale bioenergy projects.

The strategic objective is designed to leverage some of the previous efforts, as well as the results from previous projects. For example, in the first EPIC Investment Plan we are -- under the applied R&D we are developing innovative biomass-to-energy enabling technologies. And examples of this method are methods and strategies to convert biomass in a forest or urban interface or develop digestion and emission control strategies. We are expecting that some of these results, our early conclusions and recommendations will be ready to move forward for the second investment plan.

We are proposing two initiatives under objective 13. And these two initiatives are aligned with two practical routes for converting biomass to electricity. The high temperature route for a fast rate process; many of you are familiar with gasification. Those are really -- that’s an example of high temperature route, and the low temperature or biological route, primarily anaerobic digestion. These two pathways has a distinct set of deployment barriers and challenges. They are in different stages of pre-commercial and commercial readiness, and both warrant a unique set of solutions.

For the first initiative under objective 13, this is to demonstrate the technical and economic performance of emerging high temperature conversion systems and focused on

some of our woody and other high solids or organic waste or biomass. The focus is on field demonstration or early-stage deployment of thermochemical biomass-to-energy conversion technologies, systems, and market strategies. The emphasis is that these technologies should be -- have been proven successfully at the lower pilot-scale level.

The intent is to improve the technical and economic feasibility of system, for instance, improve the conversion efficiency and reduce the waste products coming out of it, including the emissions, while addressing the capital and operating and maintenance costs, and prepare basically that technology for further commercial deployment.

Examples of projects may include those that will help achieve the SB 1122 50 megawatt target for forest biomass and other related projects such as demonstration and deployment of proven technologies and strategies to expand the efficient and sustainable use of biomass to align with the fire prevention activities, demonstration of integrated thermochemical conversion systems with advanced pollution controls to meet local and state air quality standards, or demonstration of advanced biomass fuel management including handling, delivery systems, possibly densification systems to reduce transportation costs and expand the fuel markets.

The second initiative under that is to facilitate

the demonstration and early deployment of emerging bio-digester and integrated clean generation technology. This one is catering on the waste or biomass coming out of our agricultural sector, municipal, and other food processing industry. The focus of the initiative is on field demonstration, again, early-stage deployment of anaerobic digestion and enabling technologies, system, and strategies that have been successfully demonstrated, again, at the lower scale, pilot scale. The intent is to improve the overall performance of the system.

And example projects here may include biogas from wastewater treatment, municipal organic waste, diversion, food processing, and co-digestion, and in support of the SB 1122's target of 110 megawatts from these facilities. Another area is on dairy and other agricultural bioenergy that will support the SB 1122's target of 90 megawatts from those facilities. Thank you.

MS. TEN HOPE: Thank you, Rizaldo. Jamie?

MR. PATTERSON: Thank you. We're on slide 22 on objective 14. And our objective here is to take microgrid to the next level and maximize their value to customers. Our initiative for achieving that is to use microgrids to evaluate a combination of emerging technologies to determine the best integrated performance and least cost configuration to meet the customer's energy needs.

This initiative, we use microgrids as a demonstration tool for evaluating systems of integrated energy technologies and the benefits they can provide to customers and the grid. These microgrids will demonstrate the technical and economic feasibility of operating high penetrations of renewable energy sources with demand response, CHP using biomass, energy storage and energy efficiency measures. These demonstrations will also evaluate a full range of state-of-the-art clean energy technologies that include advanced vehicle charging, demand-side management strategies, and advanced microgrid controls.

In our first investment plan we demonstrated how these integrated energy systems in a microgrid can enhance reliability. The goal for this plan is to demonstrate a variety of applications and produce technical and economic performance data, such as cost and benefits, to identify the best configurations at the lowest cost for these integrated microgrid systems.

Okay, slide 23, objective 15. Our objective here is demonstrating advanced energy storage systems to lower cost and improve grid reliability. Our initiative to achieve that objective is demonstrations of advanced energy storage technologies in transmission, distribution, and customer-side applications to transition to the commercial market.

The California Independent System Operator has identified energy storage as an important resource to enable integration of renewable energy at increasing penetration levels. Under AB 2514 the California Public Utilities Commission has set energy storage procurement target decisions that requires 1,325 megawatts by 2020 starting in 2014 and made fully operational by 2024. This initiative will build upon the 12 American Recovery and Reinvestment Act funded storage projects in California that have proved the feasibility of energy storage to provide grid benefits. Information from these demonstrations will help develop an evaluation protocol for the CPUC that the public -- California Public Utilities Commission for benchmarking and reporting purposes.

Meeting California’s energy storage targets will require demonstration to advanced energy storage from an emerging technology to commercially available, viable, and cost effective technologies that can compete in the AB 2514 procurement market.

Next slide, slide 24, strategic objective 16. Our objective here is to expand smart charging and vehicle-to-grid power transfer for electric vehicles. And our initiative to achieve that is to demonstrate the ability of distributed electric vehicles to provide grid services.

Through an executive order in 2012, Governor Jerry

Brown set a target of 1.5 million zero-emission vehicles on California roads by 2025. Many of these vehicles will be owned by individuals across California. While the first investment plan focused on demonstrations with vehicle fleet owners, this second plan will expand market participation to geographically distributed individual vehicle owners, vehicle owners, in other words, that are not all located and parked in one spot. The goal is to enable individual participation of electric vehicles in the market by having them aggregated by utilities or third parties into resources that are large enough to participate in either utility or independent system operator markets. Thank you.

MS. TEN HOPE: Thank you, Jamie. And finally, Eric.

MR. STOKES: Okay. So this next -- this next initiative is for federal cost share, and it's similar to the initiative in the applied research and development section. The only difference is for this one we provide cost share for technologies that are a little further in the innovation pipeline process and are more at that demonstration, early deployment stage.

MS. TEN HOPE: So that concludes the technology demonstration portion of the presentation. The technology demonstration projects are all designed for customers to be able to kick the tires. You know, you've taken something

out of the lab and, you know, do field-scale demonstrations of projects, collect information that would allow other customers to see how these -- how these technologies work, and then deploy them on a wider scale. But even after lab testing and kicking the tires sometimes we're -- we -- you need a little bit more to move technologies into the market or to accelerate market adoption.

So this next area is market facilitation. We have four proposed objectives in this area. And Pam Doughman will present this -- these strategic initiatives.

MS. DOUGHMAN: Next slide, please. Initiatives for strategic objective 18 will address challenges facing clean energy entrepreneurs and startup companies, including a need for greater business expertise, market assessment, and access to testing equipment. Overcoming these challenges can help entrepreneurs develop a viable path to commercialization and attract capital to scale up production.

There is an initiative to provide mentoring, tools, and services to help clean energy entrepreneurs. A second initiative will facilitate feedback for entrepreneurs on specific market opportunities and customer needs. A third initiative will provide public support for third-party testing and validation of new technologies.

Next slide please. Initiatives for strategic

objective 19 address challenges emerging clean energy technologies encounter when seeking to ramp up deployment and build economies of scale. Large procurers of energy technologies such as military bases, government facilities, ports, and intermodal transportation gateways, hospitals, and building developers can help create early market pool for clean energy.

However, before investing in large quantities of energy related equipment these groups need greater certainty that the product is clearly cost effective from a life cycle perspective that takes into account all independently verified costs and benefits. They also need greater certainty that the product can be incorporated into existing systems or construction processes. They also need greater certainty that there are no impacts on the training and availability of skilled labor to install and maintain equipment, and the extent to which the new product or system affects land use or environmental permitting requirements.

Another challenge is the long lead time for large-scale procurement and construction which tends to slow the pace of adoption of clean energy innovations. To help overcome these challenges, initiatives for strategic objective 19 includes support for strategies to streamline purchasing decisions, reduce purchasing costs, and test drive clean energy equipment before embarking on large-scale

enterprise-wide procurement.

Next slide please. Initiatives for strategic objective 20 focus on challenges posed by uncertainty, costs, and delays related to regional and local planning and permitting. Improved planning at the regional and local levels can help accelerate the deployment of new clean energy technologies and strategies to increase energy, environmental, and societal benefits; these are benefits for ratepayers and local communities. However, many local governments currently lack advanced tools, information, and process innovations to deploy these technologies, leading to delays in assessing and mitigating environmental impacts and addressing other permitting concerns.

Initiatives in this strategic objective provide assistance to better integrate utility and local government planning for clean energy and improve energy reliability during emergency situations. There is also an initiative to reduce costs and reduce delay for bioenergy through development of a programmatic environmental impact report, and an initiative to streamline permitting of zero net energy home developments.

Next slide please. For those of you online, we’re still here, having a little technical difficulty, and be right back with you.

MS. KELLER: It just froze for a moment.

MS. DOUGHMAN: Uh-huh.

(Pause)

MS. DOUGHMAN: So strategic objective 21 includes an initiative to identify clean energy options and business models that provide win-win outcomes under a range of scenarios. Other initiatives will develop a clearinghouse for clean energy project results, conduct gap analysis to update research roadmaps, and perform measurements, evaluation, and verification of EPIC projects. These initiatives address the need to assist the clean energy market to develop products and strategies that are robust under a wide range of plausible potential futures, taking into account the impact of climate change on energy infrastructure and other factors that introduce uncertainty. These initiatives also address the need to track program progress and benefits.

Next slide please. Staff plans to include a chapter discussing the possible use of EPIC funding for the New Solar Homes Partnership. The New Solar Homes Partnership provides and upfront incentive to help transform the use of rooftop solar in the new housing market and make solar energy systems affordable for more IOU ratepayers. Staff plans to propose the option of using EPIC to help fund the New Solar Homes Partnership if other funding sources are not available. At this time Staff is interested in keeping

all options for NSHP funding open including combining different funding sources, provided that total funding does not exceed the $400 million cap for the New Solar Homes Partnership under Senate Bill 1 in 2006.

MS. TEN HOPE: Thank you, Pam. So that concludes the staff -- Energy Commission staff presentation on our proposed initiatives. Now it's time to hear from you. And we've posted some questions here. We're interested in whether something is missing, whether you want to underscore the importance of an initiative, or tell us you think an initiative is not needed. We're going to first take comments in the room. And then we will take comments online.

So we have a microphone. If you would announce your name and your affiliation and your question. Thank you.

MR. LYTE: Yes. My name is Bill Lyte. I'm with Burns and McDonnell. We manage large infrastructure programs for the electric utilities, and also microgrid programs for the U.S. Department of Defense.

I'd like to suggest an enhancement to strategic objective 19, which I think is a very important objective, and that is to involve California's engineering industry to a larger level. I represent 1,200 engineering firms on a port maritime board. And I know that frequently

technologies that would be very applicable to an emerging sector, like the maritime industry, simply aren't used because the engineering firms and their busy staff are very conservative, they're very busy, and they're at risk adverse, and they don't have time to learn about these new technologies. So there should be a formalized program under EPIC to educate these firms, their project managers, and the young engineers about the technologies and their overall benefits.

MS. TEN HOPE: Thank you. Could I also ask that after you speak if you would give a card to the court reporter. Thank you.

Anybody else? Oh.

MS. KAMER: Hi. I'm Krista Kamer. I'm from the California State University Council on Ocean Affairs, Science and Technology. And I want to thank you for holding this workshop today and allowing for public comments.

So SCU COAST is the umbrella organization for marine and coastal research and education in the CSU, which is the largest public and most diverse university system in the country. We have 23 campuses spanning the state from San Diego State in the south to Humboldt State in the north. And the group that I run, COAST, is now six years old, and we've built -- we've built a substantial membership of about 400 faculty members and research scientists from throughout

the entire CSU. We represent every single campus, which there are 23, and a broad array of disciplines and research interests.

And I'm primarily interested in renewable -- marine renewable technology, which I didn't actually hear mention of, though I felt that there were several places in the different investment areas that it could fit, especially applied research development and market facilitation. So I hope it's something that will be considered and included, either in the second Triennial Plan, or the third as you move forward.

But I wanted to talk about the ways in which we're interested in marine renewable technologies. Specifically, there are areas that will require study as we move toward the development and deployment of wave and tidal energy conversion devices, and those are impacts to benthic habitats and organisms, impacts to pelagic species including fish, birds, mammals and turtles, and impacts to coastal dynamics and geomorphology. And so understanding these impacts will require significant study and modeling. But the results will facilitate smarter deployment and upfront mitigation to alleviate any negative effects, which I think is very critical.

I'm referring specifically to siting technologies to minimize impacts and to incorporating design elements

into the technology itself to minimize impacts.

MS. TEN HOPE: Could you hold the microphone closer? The people online are having trouble hearing.

MS. KAMER: Okay. So investing in these research efforts up front and incorporating the results into planning with smooth public acceptance, I believe, of marine renewables, because we'll be demonstrating a responsible approach -- a responsible approach to sustainable use of our coastal zone from the outset.

So I'm delivering these comments now in the morning to the CEC portion of this. But I also wanted to say that I think these comments could pertain to the investor-owned utility investment plans. So if marine renewables are something that they'll be pursuing, as well, we'd like to help them do it in a way that ensures responsible sustainable technology development and deployment. Thank you.

MS. TEN HOPE: Thank you for your comments.

MR. KIM: Hello. My name is In Kim. I'm ADC Energy USA, Incorporated. We have -- we are a new startup company. We have a new patented technology which can help lighting or future electronics. We can generate A/C and D/C at the same time. We're not converting any energy so it's a zero-percent conversion.

And how do I implement our technology, prove to

you guys and start up implementing to the system? I feel like, you know, we can help this initiative a lot. And we have a demonstration about ten minutes away. Our company changed all the 500 bulbs to LED, D/C. And we already had a significant electric -- I mean drastic reduction and we are paying much less than before. And I'd like to, you know, show you and implement and get help for state or anybody.

MS. TEN HOPE: I would encourage you at this point to, you know, to look at the initiatives when they're posted and provide comments. If you think you have a breakthrough technology not reflected, then tell us why not.

MR. KIM: Thank you.

MS. HULL: Hello. I'm Kelly Hull with Bright Footprint. And my question is for Eric Stokes about Initiative S-11. And you mention leveraging federal awards. Are you inferring Prop 39 money, or what do you mean by federal awards?

MR. STOKES: Typically the U.S. Department of Energy issues what's called -- can you hear me -- they issue what's called federal opportunity announcements, and it's a similar process to ours. Potential applicants apply to -- in to those awards, and they receive the awards. Typically with FOAs they require some form of cost share. So what we would do is applicants that would apply to the federal solicitation could also

apply through a process we would implement. And if we deemed them to be eligible we would provide a letter of support or commitment saying if you received the federal award then EPIC funds could be used as potential cost share for that.

MS. HULL: Can we also use the Prop 39 funding in that initiative?

MR. STOKES: No, I don't believe so.

MS. TEN HOPE: Are there any other questions at this time? Do we have questions online? Are we doing -- how should people identify themselves?

MS. DOUGHMAN: So for those who are participating through WebEx, please type your questions into the chat window and I will read them to the audience and this panel here. Are there any questions from people on the WebEx?

MS. TEN HOPE: No? Okay. No further comments in the room?

So let me ask our utility colleagues if you want to break early for lunch or if you would like to start your presentation?

(Colloquy Between Commissioners and Attendees)

MS. TEN HOPE: And how long do you recommend for a lunch break?

MS. KELLER: I'm going to announce all that.

MS. TEN HOPE: All right.

MS. KELLER: Okay.

MS. TEN HOPE: Thank you.

MS. KELLER: We're going to break until 1:15. A couple of things. There is a list of local restaurants I've placed up on that high table on the back. They're true and tested by all of us, reasonably priced, and excellent food. You will need your badge, visitor badge on to come back in. When you come back you won't have to go through the front door, you can go to the guard at the side here and she will let you in, but you must have your badge. If you've lost it for some reason at lunch or whatever, please go back through the front and sign in again and she'll provide you with another badge.

So we are going to start promptly at 1:15, so you've got a little bit extra time to enjoy a nice leisurely lunch. And again, we're all happy to see you.

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

(On the record at 1:17 p.m.)

MS. KELLER: Okay, everybody, we're going to get started, if you could please have a seat.

Do we have any new faces here that weren't here this morning when I did the safety briefing? Oh, you weren't here. Okay. I'm going to start. I'm going to do it real, real quick.

In the event of an earthquake you want to duck and

cover under chairs, under tables. Do not leave the room. In the event of a fire or other emergency you're going to leave through that exit door right there. Just ignore the stop, just keep on going, and go out to area three in the parking lot where you'll be joined by the rest of the group. We want to make sure you're all signed in at the front desk with your cell numbers. We want to know where you are in case of an emergency.

The restrooms are just outside the door, sharp right, on the other side of this wall. We have coffee -- I'm hoping that it's still hot, I think it is -- and water for your enjoyment. If it gets too cold or too hot, please come and tell me because I can adjust it in here. And I think that pretty much covers everything. Oh, please silence your cell phones. Thank you very much, and we're happy to see you.

MS. MOORE: Good afternoon. Welcome to the second half of our Joint Workshop for the Electric Program Investment Charge Program. The purpose of today's workshop is to solicit stakeholder and public input on draft funding initiatives for the 2015-2017 EPIC Triennial Investment Plans. This morning's segment focused on the CEC's draft initiatives. And this afternoon's segment will focus on the investor-owned utilities or IOUs draft initiatives. The IOU administrators of the EPIC Program are Pacific Gas and

Electric Company, Southern California Edison Company, and San Diego Gas and Electric Company.

My name is Amanda Moore, Regulatory Case Manager for Pacific Gas and Electric Company. And on behalf of all of the IOU EPIC administrators, I'd like to welcome you to today's workshop.

Please note that this meeting is being recorded. A recording and transcript will be posted on the Energy Commission's web page. This afternoon's discussion will -- will begin with John Minnicucci of Southern California Edison who will provide an overview of the EPIC investment framework from the IOU perspective. Next we will have a segment where we will discuss each of the utilities' EPIC Investment Plans for the 2015-2017 cycle. We will begin with Percy Harlson of SCE. That will be followed by Suna Taymaz of PG&E, Frank Goodman of SCG&E.

Next we will have a discussion of EPIC intellectual property issues, and that will be covered by John Minnicucci of SCE. We will also have a discussion of the EPIC research development and deployment journey, and that will be a joint IOU discussion lead by Suna Taymaz of PG&E. Finally, we will have the opportunity for public comments here in the room, as well as on the phone.

So without further ado, let's get started with our presentation with John Minnicucci.

MR. MINNICUCCI: Well, thank you. I'm supposed to talk into this thing.

So the next couple of slides, we've presented these a number of times over the past, actually, couple of years. And the reason we present these slides at almost every workshop or webinar is to provide the context that we -- we're working within -- in the state of California.

So what you see -- next slide please. What you see behind me is just a survey of some of California's energy goals. I'm not going to go into detail on all of these. But, you know, just to provide a little background, the -- one of the -- one of the goals that California has set forth is with respect to once-through cooling. So a lot of the generating plants along the coast of California will no longer be able to operate in the manner in which they had operated, basically taking ocean water in to cool and putting the ocean water back out.

So over the next couple of years the policy will apply to 19 power plants, and they will either have to retrofit or shut down. What this does is this causes issues with the grid or has the potential to cause issues with the grid because the -- the rotating mass that we rely on in order to maintain stability will be changing and evolving. When you couple that with the renewables portfolio standard which is going to put different types of generation onto the

system, types of generation that are not as predictable as the older more traditional forms of generation, again, that exacerbates a potential problem for maintaining grid stability and reliability.

One of the other notables, the governor's 12,000 megawatt localized energy resource goal, in -- at Southern California Edison our grid, the distribution system was not designed for the two-way power flows, the intermittency that we would expect with this large number of distributed energy resources. And there are things that we're going to have to do to figure out how to deal with it. One of the key items would be to model and understand what it is, as well as demonstrating different solutions.

And the last one I wanted to talk about is one that's very recent, and that's the energy storage procurement target. That has just come out. And the three utilities will have to procure 1,325 megawatts of storage capacity, and I think that's through 2020. So that is -- it's a fairly aggressive target and with a fairly nascent technology set. Here at Southern California Edison we've got batteries across the street. We have a home energy battery in the labs behind us. And we're -- we're working very diligently to figure out how to move forward, as are the other utilities.

So next slide please. So, you know, how does --

how does all this translate? So we're -- we're moving from reliability through grid inertia to a generation mix that's not as predictable as what we once had? How do you deal with that? Is storage going to be -- is that going to be the solution? I don't know if it's going to be the solution. It may be a solution.

Dispatchable generation. You know, currently and in the past you could call upon a generator to react in a certain way. But the wind blows when the wind blows and the sun shines when it shines. And as you've seen out here in beautiful sunny California, there are clouds in the sky. And all of these things impact the solar resources that we would expect to have on our distribution system. Again, this is -- is basically managing reliability on a circuit-by-circuit level.

Passive and predictable loads. As we transition into a new environment with smart meters, you know, transactive loads may be something that's doable. Demand response would be something you could consider a transactive load.

Human-in-the-loop grid management is -- you know, those of us in the electric industry or those in the periphery of the industry, we have historically managed the system in a centralized manner and controlled the system in the same manner. But what -- what you're going to see in

the future with a lot of distributed resources is really the need for distributed intelligence. As these resources come on and come off in a less predictable manner you're going to need to address that on the spot or you're going to face reliability issues. And it's no longer big blocks of power that you move around the grid. It's going to be on a distribution-circuit-by-distribution-circuit basis as -- as we move further into the future.

And then, you know, as I had discussed before, rigid centralized system control, well, that's really not the paradigm we're looking at with all of the -- the policies that I had discussed previously.

Next slide please. So a little bit about the Electric Program Investment Charge and what it is and what it isn't with respect to the utilities. Overall the EPIC Program is a $162 million program. The CEC will be administering 80 percent of the program, and the utilities will administer 20 percent. The portion with which we're allowed to administer is only on the technology demonstrations and deployments. So in a nutshell, things that we're basically going to either be modeling for the attachment to the grid or -- or in bigger senses what you would typically consider a pilot, those are the types of things that the utilities will be doing. And we will not be doing any of the applied research or market facilitation.

Those are two sections that are applicable to the CEC and the CEC only.

And then the electric system value chain, the utilities are generally responsible for grid operations. We work in market design and tariff design, the distribution system, and the transmission system. We are precluded from using the funding we receive in EPIC to do generation or demand-side management, or also we're not allowed to do energy efficiency with these funds.

Next slide please. This is -- this is a slide I'm, frankly, very proud of. And honestly, there's a lot of credit to be given to my colleagues PG&E and my colleagues from San Diego Gas and Electric. We worked for months to figure out what a common framework would look like for all three utilities. We all generally face the same issues. But how do we communicate those issues? How do we coordinate our programs? How do you provide an apples-to-apples comparison? And that's what we think this framework does.

So the items or the areas in which we'll be focusing are renewables and distributed energy resource integration, grid modernization and optimization, customer-focused products and services enablement, and crosscutting foundational strategies and technologies. So the first three seem fairly easy to understand. You know, you're

going to modernize the grid. There are things that are going to make operations more efficient, allow us to do deal with some of the changing grid requirements. Renewables and DER integration, as I had talked about before, there are upgrades that we're going to need to make to address those issues.

You know, the customer participating in the grid, we've all deployed smart meters, and customer participation is something that we would expect would continue or advance because of the deployments that we've made. But the crosscutting and foundational piece, that's the thing that wraps it all together. What is the right grid architecture? What is the right cyber security architecture? What's the right communication strategy?

All three utilities, even subsets within the utility have different voltages on their distribution system, different strategies for communicating, because as these companies evolved it wasn't just this one plan that built everything. We evolved because as we took on greater responsibility for greater territory there were already electric systems that we -- I don't know what the right word is, but that we, I guess, subsumed or incorporated into our broader system. And in doing that the -- the original reasons for doing that were, one, it was more effective to operate the system that way. And it's much more reliable

when you link things together. If one generation -- or generator were to go down you could rely on backups or other generators to supply the load.

So as we evolved what we evolved into or may be different than what we need to evolve into in the future. And you need to take a holistic look at what that future might be. And that's kind of what this crosscutting and foundational strategies and technologies section is about.

So with that I think I'm done, and it's back to Amanda.

MS. MOORE: Thank you, John, for providing that overview of SCE -- of the utility framework for the second investment plan.

So up next we have Percy Harlson of SCE who will provide an overview of SCE's 2015-2017 EPIC Investment Plan.

MR. HARLSON: Thank you, Amanda. Next slide. There. Okay.

As John had indicated, the framework that the potential projects fit into is consistent with one -- with the one that was used for the first EPIC filing. The framework consists of the four categories which includes renewable and distributed energy resource integration, grid modernization and optimization, customer-focused products and services, and finally, crosscutting and foundational strategies.

We currently have 21 potential projects that cross these four categories slated for our EPIC 2 Program. I know we don't have the time to cover all of them, so I'm just going to kind of give you a taste of SCE's likely EPIC 2 portfolio. I'll take five examples, and we'll go into these in a little bit more detail for each of them.

Next slide. Okay, our first one is the optimized control of multiple storage systems. And this is in the area of renewables and distributed energy resource integration. In response to the CPUC's storage OIR, SEC is mandated to procure or deploy 580 megawatts or storage into our grid. Storage is a new technology to the grid and it comes with a number of challenges. This project is focused on mitigating those challenges associated with implementing a flexible control scheme over many storage units.

Issues of communication standards, protocols, control strategies, interoperability, will all need to be addressed. Every manufacturer has their own interpretation of those standards and the different features that they're going to bring to their products. Now, I can remember many years ago the pain that we went through with different manufacturers of capacitor banks, capacitor controls, trying to get them to all work together. Even the ones that met the same communications standard, which at the time was DNP3, they didn't necessarily all interpret the standard the

same way. So I'm expecting to see the same type of problem with the storage units.

The other problems that we had, too, were getting those devices to work with our radio network for the communications. And then, finally, getting them interfaced to our back office systems and control systems and getting all that to work together finally. It's not an easy task.

Storage is a very versatile technology that can be used for a number of different grid needs like energy smoothing, demand response, voltage, VAR support, and many others that I can't even think of. They can operate in stand-alone automatic modes, or some may be able to support peer-to-peer communications and work together with each other, while other control schemes will include a central control system instead forward in communicating with these devices. The important point is that they need to function as a team and they have to optimize their support in the changing needs of the grid, and that's what this project is about.

Next slide. Okay, the next project is the --

MS. MOORE: For everyone on WebEx, we're having a bit of technical difficulties. We'll resume in just a moment.

MR. HARLSON: Okay.

MS. MOORE: All right, Percy, you're on.

MR. HARLSON: Okay. The next project is the Versatile Plug-in Auxiliary Power System, or VAPS. And this is in the grid modernization and optimization section. When work is being done in the field our trucks spend a lot of time idling. And small generators are used in combination to power essential equipment and tools to get the work done. This all results in fuel consumption, emissions, noise, and that's both for the crew and for the customers, and more wear and tear on the equipment and the trucks.

This project will focus on demonstration how a mobile storage system can provide the energy for all the loads and reduce or eliminate the need for the engines to run while out at the job site. The project will leverage the battery technology being used in electric vehicles like the Chevy Volt and the Ford Focus EV. It will be used -- it will be using lithium ion battery technology, which is also being used in SCE's Tehachapi Wind Storage Project.

The program will demonstrate a system that uses the batteries to supply D/C power to both an A/C inverter and a D/C-to-D/C converter to provide both A/C and D/C power to meet all the needs of all the -- of all the tools and equipment at the job site. The system will also incorporate a battery and energy management system to monitor and control the charge and discharge of the battery and provide system diagnostics under all operating different -- or under

different operating conditions.

Additionally, the project will investigate taking advantage of secondary use of EV batteries. Now, just because the batteries have kind of come to the end of their life for transportation uses, it may actually fit this use well. And this may give us a method to get more out of those used EV batteries before they're disposed of or recycled. Okay.

The next project -- our next project is the cyber autoresponse and policy management system. This is a crosscutting and foundational strategy and technology item. Cyber security is essential to our grid and the focus. And the focus of the security systems has been to keep attackers out and to recognize when the systems have been compromised so that operators can take action to mitigate the intrusion, you know, much like a home with locks and intrusion detection being monitored by a security company. Sometimes intrusions happen quickly though, and damage can be done faster than people can figure it out and take action to stop it.

But wouldn't it be great if someone breaking into your home could be recognized by the security system and the security system could basically throw the person out and rekey the locks, right, seal up the point of entry and do that all by itself, without waiting for someone to come to

its rescue? Well, that's exactly the concept of this demonstration.

This project will demonstrate the ability of SCE's common cyber security services to support auto-intrusion response technology. The CCS, Common Cyber Security Services, is leveraged from technology that was developed for the Department of Defense and the NSA, and it's transferring that technology to support grid security. The CCS will recognize and attack, take automatic action to protect the electric system through the use of advanced cyber security policies on devices. The demonstration will deploy these security policies on utility equipment such as digital fault recorders, smart inverters, and protective relays.

And the next slide. Okay. Okay. The next one is the -- the California ISO operations and utility grid coordination. This is a crosscutting and foundational strategy and technology item. The California ISO is tasked with balancing generation with load while managing the dispatch of ancillary services and operating the wholesale markets. But they have very little visibility and access to the growing small scale preferred resources on the distribution system. Additionally, there's no mechanism for the coordination of these resources between the distribution system operator, like SCE, and the wholesale market

operator, California ISO.

This project will demonstrate how these issues can be mitigated through the use of communications and establishing a standardized grid needs signal that is separate from wholesale price. Wholesale price just has no meaning to retail customers. This project is technology and communications focused and is not a demand response project. The whole concept is to use customer-owned resources such as load controlling devices, storage devices, and distributed generation that can be called upon to support grid reliability.

Next slide. Okay. The next project is the microgrid for enhanced grid reliability and security. And this is a crosscutting and foundational strategy and technologies item. Now, there's no question that here in California we're blessed with good weather. And we all know the brutal winter that most of the country has just experienced. And who can forget the wrath of Super Storm Sandy and the devastation and the utility outages that it brought on the East Coast. As good as life is here in California, we and our electric grid are not immune to the effects of disasters, disasters like earthquakes, windstorms and fires.

One thing that came out of the study of Super Storm Sandy was that establishing microgrids may help the

grid to be more resilient to these kind of disasters. Unfortunately, there's no accepted standards to implement and control microgrids and the integration with the utility grid. This project will demonstrate the use of advanced microgrid controllers that will manage and control the microgrid resources, even during disaster conditions, to further the goal of energy resilience. The project will also demonstrate how these microgrid resources can be called upon to support the grid in times of need.

Since microgrids are going to come in all different shapes and sizes and capabilities for the future the project will demonstrate how microgrids, and even mini-microgrids, something you'd have maybe on a very small campus, may be able to participate in further strengthening the grid.

And with that, I think that's my last one.

MS. MOORE: Yes, it is.

MR. HARLSON: Okay.

MS. MOORE: Thank you, Percy.

MR. HARLSON: Thank you.

MS. MOORE: Thank you for providing the overview of SCE's plan.

Up next we have Suna Taymaz of PG&E. She will provide and overview of PG&E's EPIC Investment Plan.

MS. TAYMAZ: Thanks, Amanda. Hello, everyone. So

what you're seeing here is our investment plan framework. As Frank [sic] and Percy mentioned, we all follow the same investment framework. These are our potential demonstration projects proposed for the 2015-2017 period.

Just a little bit of background, for the last two-and-a-half months, say from January, PG&E, as well as, I'm sure, my other utility colleagues have been engaged in this ideation process to establish what is our proposed portfolio of demonstration projects starting next year. And as part of this process we held internal workshops with planners, distribution operators, our IT folks, our architecture folks, really a wide and varied list, emergency response folks, field crew representatives, our customer programs, energy procurement. And really the point of this is because when -- when we talk about these projects they're not kind of coming up in a bubble. They're based on real challenges that our folks are seeing, either right now on the grid or they expect to see not -- in the not too distant future.

As part of this process we also engage with various external bodies. So we have our industry associations, utility benchmarking, various commissions, NREL, EPRI, academia, members of just the business community. And so what we put forth is what we believe, based on the feedback, as well, we believe it will provide benefits to our customers, as well as to our operations. We

also believe they will help identify and respond and address the emergent grid challenges, and help us to continue to provide safe, reliable and affordable services into this century, and advance key policy objectives such as the energy procurement -- energy storage procurement mandates, the 33 percent renewable portfolio standards, and SB 17 smart grid goals.

So with that I'm going to highlight some of the technology demonstration and deployment projects mentioned here. And then the items in blue I'll go into in more detail on the next slides.

So the first category is renewable and distributed energy resources integration, DER integration, DER. Percy described the main challenges here. Our proposed projects really focus on demonstrating the technologies available to integrate DER, give us visibility of DG onto the system, as well as a visibility of storage, be that utility side or customer side or community side, and help us integrate, essentially, these new parameters into our processes. And so when I talk about integration that covers the planning for these -- these assets, planning for reliability, and actual grid integration that -- that considers the effects of all these new sources on our system. It also entails a real-time coordination and control of such systems so that they can meet utility operating needs or be called for

market needs or for the customers needs.

Going down the slide you'll see the various types of demonstrations, so I won't read them all but I will highlight a few. Storage on the grid, John has mentioned it, Percy's mentioned. I'm sure Frank is going to mention it as well. We, like the other utilities, have some demonstration storage projects out there. We have about six megawatts of storage right now. The storage procurement calls for 1,325 megawatts of storage procured between the three utilities. So we have, I'd say, lots of work to do there to make sure that we integrate that safely, reliably and cost affordably. I'm not including our pumped hydro storage which is -- which is separate.

So our demonstration in this area would seek to facilitate that cost effective procurement of storage, also the deployment and operationalization of the rather large amount of distributed storage. Part of the demonstration would look at the range of placements on the grids, is there a better or worse placements, what types of storage are optimal, control and coordination of the storage resources, and be that whether operating on the grid side or being called into market, so slightly different types of operations there. It could be for load peak reduction needs, or smoothing renewable resources, or operating, as I mentioned, on the market side or on the grid side.

Next I'll go to the gird modernization and optimization category. So I would characterize the projects in this section as really demonstrating the various types of new smart sensing technologies that have -- that have come onto the market, really in the last couple of years. And so this would be piloting some of these real-time sensing technologies, these real-time asset monitoring technologies, and piloting innovative mobile apps that can take that information real-time and enable our field crews and emergency responders to use that information real-time, in the moment. The catch word there is closer to the trouble.

So we can't get around the fact that we have an infrastructure built over the past 100 years. Our average asset age is between 40 and 50 years. And so just to give you a sense of the PG&E territory, we have 18,500 miles of transmission lines. We have a 70,000 square mile service territory, and 884 substations. So anything that we can do to extend safely the life of these assets or be alert to real-time conditions in the field or that assets operating condition, or provide a path, an affordable path to update those assets to new technologies along a, you know, rational cost effective path would really help lower our investments, lower our operating costs, and in turn pass those savings on to our customers.

So in this section essentially smart -- smart

monitoring and analysis tools for real-time asset management, as I mentioned, is a focus area. Many devices have come onto the scene that control and coordinate the assets, and we'd like to demonstrate some of these.

The second item on the list is demonstrating the substation of the future. And so you might also be familiar with the term digital substation. There's lots of various readings and information, really rich information that comes out at the substation, things like voltage, temperature, capacity, operating conditions. And so newer technologies combine this information to give you really rich information for planning and coordination and operation.

And I'll jump to, let me see here, the mobile technology. So we have a pretty large focus here on new mobile technology and visualization techniques for the field. So field technology has quite evolved over the last 100 years. We've gone from paper and pencil to ruggedized laptops to some of these newer innovative very flexible mobile apps and hands-free devices that combine with technologies such as social media, GIS, other routing technologies, combining with different software and hardware, devices and senses, really helps our field force perhaps literally free up their hands, all the various equipment that they're carrying, and provides them with the knowledge they need at the source of the trouble to respond

and react, communicate with other field crew, with the public, with first responders, and allow customers to also communicate with the field crew in a more real-time manner, provide diagnostics, alert folks to hazards, guide them out of the way of that hazard, and update records all in real-time. So lots of exciting things in that area.

The third area is customer-focused products and services. Several items to highlight here include, essentially, providing better real-time information to our customers. And so we have that capability now with -- with real-time data and we want to extend that to our customers, and so extending existing pilots such as the Home Area Network from residential to commercial customers, a deeper level of innovative data analytics and technology to integrate customer-side strategies into grid operations. A way to look at this is, you know, we've moved from traditional generation at one end and then customer at the other end to the customer at the middle of the -- the value chain across the markets, the grid, etcetera.

And so, you know, there's really a role to be played using these various technologies and information to put the customer at the center, play an imbedded role in our operations, an imbedded role in the markets. And so we are getting closer with our demand response programs, demand-side management programs, energy efficiency programs, but

this really focuses on the grid integration aspect of that to make that meaningful circuit-by-circuit connection.

And so the last area is crosscutting foundational strategies and technologies. The themes that we brought out throughout the presentation and the grid challenges is really interoperability, automation, integration standards. And so you simply need to invest in crosscutting foundational technologies to make all this work in a seamless manner. And so that includes the standards, the information architecture, the networks, the cyber security, etcetera.

We have a significant focus on advanced metering infrastructure, the AMI network. It's a big priority for us to provide a path for our customers and vendors to connect and communicate across various different devices, different standards, different applications, that can be EV, that could be smart appliances. And so we need to be sure ensure that we have a network that allows for this open architecture or open seamless integration of various devices, both that we know of and that we don't simply yet know of. And so that's really the focus of -- of the crosscutting section.

So next I'll dive into detail on a couple of -- a couple of projects. Thanks, Amanda.

So first one is on distributed storage on -- on

the distribution grid. So we've talked about the storage one in a little bit of detail. But really this is about integrating increasing amounts of storage on the grid. We, you know, we know it's happening so, you know, we need to enable this in a way that has a standard consistent methodology, a standard process to do so, and we're simply not there yet. We do know that there are likely better and worse places for storage on the grid.

We -- from a safety perspective, a reliability perspective, as well as a cost effectiveness point of view, this demonstration would seek to develop the right methodology and tools to integrate storage based on this understanding of better locations, modeling of the benefits, the risks and the costs to the various locations, types of storage, etcetera. So conceptually this could be a tool or feeds into a tool that scores storage alternative sites, alternative types of storage, and provides kind of a standardized method to evaluate the different types of storage and how they would interact with grid operations. So this would inform the roadmap for future storage deployments, as well, and provide a way to simplify the grid interconnection process as well.

For primary benefits of this project, I mentioned policy attainment. But clearly what we are trying to do is assess storage as a method to also improve or maintain

reliability on the grid with the growing amounts of renewable DER on the grid as well.

And so I'll go to the next one. So from the grid modernization and optimization category, this is about demonstrating emergency preparedness modeling and emergency management mobile applications. So as Percy mentioned, and as I'm sure you see in the news all the time, especially in the recent months and years, various examples in the U.S., as well as around the world, of how power systems were disrupted based on storms, tsunamis, other events, folks who are simply caught off guard for restoration activities, or they took a long time, longer than planned because of more severe storms than expected or simply not having the capabilities to ramp up quickly enough.

Other natural hazards, they're going to happen. And the ability to respond rapidly really is based on your ability to proactively understand and define and predict those events. And then you can -- you can create scenario-based planning to really respond in time and based on those various scenarios and how they play out.

So this demonstration would seek to pilot a holistic natural hazard damage model. There are options out there today. And so proof of concept would integrate the models with utility assets to estimate the impacts of a natural hazard on our utility facilities. The proof of

concept could model the impact to the transmission or distribution grid, the impact to customers, and quantify those potential outages. Knowing this information will allow our responders to respond timely and with the adequate resources based on that specific event, and so that we can avoid long periods of -- periods of outages for our customers.

So PG&E has developed basic models for outage and restoration activities. And we would seek to extend this -- seek to extend this in a broader manner, leverage more advanced technologies, leverage virtualization, a developed risk ranking and impact analysis methodology to calculate a holistic look at the system, potential losses and outages, and really use that in a tactive (phonetic), proactive manner to restore power.

In addition, we would pair this with improved mobile technology for the better in the field response. In a simple example, a customer calls and reports a wire down in a storm, and we will send a truck out to assess that wire. Well, in many of those cases that wire down might be a telephone wire. So instead, if that customer could take a picture and send that picture in with the phone call we could quickly assess what kind of wire it is, not send -- roll the emergency crew out there, perhaps direct that to the telephone company instead. So in that way we've saved

the emergency responders to really respond to the -- to the emergencies, avoid a truck roll an the GHG emissions that come along with that, and really improve our services and our operational efficiencies.

Next slide please.

MS. MOORE: We're having a bit of technical difficulties. We will resume in just one moment.

(Colloquy Between Presenters)

MS. TAYMAZ: That's it? All right. So now we're on to the proposed demonstration under customer-focused products and services. So as I mentioned before, we do have strong energy efficiency and demand response programs. But really optimizing our demand-side management programs is really important. And the evidence suggests that more can be done for the effectiveness of those programs, leveraging new technology, and really getting, as I mentioned before, kind of focused circuit-by-circuit improved -- improved efficiency.

So as mentioned previously, the customer has moved to the center of utility and market operations. To get there and to really have customers participate in this system requires new strategies, tools, and incentives to get -- to have this happen. And so we would seek to demonstrate those technologies. The availability and use of real-time data is one such demonstration area. So how can

we use real-time grid data, market data, etcetera, to help incent increased demand-side participation?

So one are we're -- we're proposing to look at is the concept of gamification, which is a significant trend in recent years. So using it in a non-gaming context, we could potentially employ tools to help change behaviors, how we interact with customers, also how we engage our own employees to drive innovation. So while gamification in the enterprise sense is new, I'm sure you might have all played a video game or two.

And so traditional games use points, reward badges, levels, status broadcasts. So you combine this with social media and real-time data and we potentially have an opportunity to really advance our EE and DR programs in a significant manner, maybe a fun manner as well, to help meet policy goals, achieve grid integration, really enhance collaborative strategies that incent both the customer and the markets, you know, to participate on the grid.

So my last slide is on the crosscutting demonstration area. So as I had mentioned, the next generation AMI network is an area for us for demonstrations. In this one we focus on a licensed spectrum demonstration for the network. So both licensed and unlicensed spectrum exists. USAMI tends to be dominated by unlicensed spectrum which has many benefits carried over the mesh network, but

it's not the only option. As this is a T&D program we would like to demonstrate potential benefits from additional licensed spectrum to help with smart grid communications, be that customer-side applications and their communications, distributed -- distribution automation, customer enablement, so different options there.

This demonstration would explore the new licensed vendor technologies, the use cases and benefits as it relates to these different applications. For example, the things we would look at is the benefits of -- with licensed spectrum and the range of communications, bandwidth interference, communication reliability, and interoperability of devices on the communication system. These options are important, not just to understand our AMI system and its kind of limitations or the next generation of AMI systems, but also so that we're not just -- you know, we're evolving the network from -- from where it started, which is automated meter reading, to more interoperability, more devices on the network and, frankly, other smart grid communication not yet -- that we don't yet know of.

And I think with that I'll turn it over to Amanda.

MS. MOORE: Thank you very much, Suna, for providing that overview of PG&E's second investment plan.

Up next we have Frank Goodman who will provide an overview of SDG&E's EPIC Investment Plan.

MR. GOODMAN: Thank you, Amanda. I will pretty much follow the same pattern you saw with the other two IOUs. I'll start with this overview slide of the framework and how we are aligning our work with the different initiatives in the framework.

I'll just mention, organizationally we have our R&D placed in what's called the Technology Innovation and Development section at SDG&E. So if you've got -- yeah, we've got the right slide there. You see here the same framework, that the other IOUs have teamed together with us and we are all trying to use this as a coordination vehicle. In the first cycle for EPIC we had all of our projects placed in the middle column. And this time around we've actually spread them around. We are following through on a few things in Tri 2 that were started in Tri 1. But most of what we're doing is new material.

And we have one project in the left most column dealing with distributed resource generation. It actually straddles into the grid modernization center column as well. So that project on the left-hand side really straddles two areas, but we decided that the primary placement is in the DER integration. And then the three in the middle deal with grid modernization primarily. And the one on the right is customer related. We do have the bottom some crosscutting stuff dealing with participation in collaboratives where we

get a lot of leverage for our money by becoming aware of and getting information from demonstration activities going on worldwide and avoid reinventing the wheel, among other things. But also better informing what we do in our own programs by being aware of what's going on elsewhere.

So I'm going to walk through the five projects in the upper three columns. It's five out of six projects that will be in our program. And I'll just mention that this is vetted and arrived at through an extremely laborious project -- project -- process, such as was described by the other IOUs, involving interaction with a wide variety of stakeholders, including each other, and including internal vetting with our own organization, and then the outside interaction with organizations such like -- such as EPRI which was mentioned earlier.

So this is where we're at right now. It goes through a governance process at SDG&E. And ultimately the approval of the content comes from -- from the governance team, which is a group of directors at SDG&E. And then it goes in the plan and goes onto the PUC for ultimate process of decision making.

Moving now to the first project area, this one is modernization of distribution system and integration of DG and DS, and the two go hand in hand. If you think of this as a DG-DS integration project only you very quickly realize

you're ignoring and not considering the integration and interaction of DG and DS with other smart devices coming into the system, such as there was a gentleman, Greg from One-Cycle Control here, there are power-electronic only components that could do some of the functionality you might do with the back end of a distributed generation or storage device. And things like volt/VAR management and other nontraditional functions of DER could also be done by a power-electronic only solution. And then there are other smart devices coming of age. To use that word smart, we mean power-electronic controlled or actively microprocessor controlled devices.

So you can't just in isolation solve the DG integration problem. You must consider the interaction with other controllable electronic devices as a total package and arrive at a smart circuit solution. That's the approach we're taking in this project. And it will follow through to try one work where the focus was on valuation of the grid support functions of DER. That's what we had as a project in Tri 1. It's being launched right now. So the focus there was on valuation of grid support functions.

We move to the next step in Tri 2 and start looking at once you've decided which functions have sufficient value to pursue on a widespread commercialization process, how do you do the integration into a blend of

complex controllable devices in your circuits?

And a couple of examples of what we might do in this area, one is taking a look at power factor control versus volt/VAR control as a way of solving voltage -- voltage fluctuation problems. Or a second one is looking at stacking storage functions in a circuit application where you've installed storage at considerable cost, let's say it was batteries, and it has a primary function of peak load shaving or renewable smoothing, and is there a way you can take these storage devices with the major capital investment associated with them and use them for multiple functions at different times of the day, for example. So looking at multi-use of storage infrastructure is another example.

In all of our projects the implementation plan once the project is approved we'll flesh out the detailed tests that will be done and the -- and the metrics that are associated with those tests will be flushed out. So at this stage we are -- we are giving an overview. And we drilled down into an actual test plan as the first phase of any project.

The next project -- oh, let me -- let me stop for a minute and introduce Kelvin Ellis who is on our team. I caught him tying his shoe. He's actually the principle authority and project manager assigned to work in that area.

Okay, the next project is the data analytics in

support of advanced planning and system operations. And here we have a situation where all the new devices going out there from AMI to syncrophasors, new sensors, any power-electronic device you put out there has to monitor system voltage and current to operate itself, and therefore it can be used as a sensor, as well. So you're going to have this tsunami of data coming at you from all these devices put out in the system and you have to manage the data. And that's what this project is about, is trying to optimize that process and consider what data is coming, where it's coming from, and how it might be used.

And then you try to develop an optimum strategy around filtering and discarding data you don't need at the lowest level in your hierarchy that you can, applying the data to a task at whatever level it is useful, and then only sending up to a higher level what you need to for tasks upstream.

So this project will do that. It will consider standards and communication infrastructure that go with -- and protocols that go with moving the data from wherever you need to move it to wherever you need to move it. And this project will also benefit customers. Because if you have all this data what you want to do is be applying it in a strategic way that operates the system more efficiently to the benefit of the ratepayers.

Next project please. Now, this one is -- takes you to the next step. Once you've got handling the data under control, then you move to the step of doing something useful with it. And that's what the monitoring and control and communication project is about. It is a way of taking our advanced automation to a new level and trying to benefit the ratepayers by making sure we are strategically using all this smart infrastructure to the maximum value, and don't have smart devices that are working against each other but are actually complimenting each other in a way that provides the greatest value to the ratepayer by way of enhanced system operations.

So we will pilot alternative solutions to build up this system of systems concept to do this optimized operation. And this will support our deployment programs. It will help in making choices on what systems to use for various functions.

Next slide please. This one is on system operations development and advancement. And we have done a lot of brainstorming internally about this and we know from our participation in various workshops externally that it's a big issue. And that is you have to have your -- your workforce, your training, and your skill sets continually evolving to match the new infrastructure that you're deploying. And it needs to be an ongoing process because

the modernization process probably never ends. There will always be new devices to assimilate or to reject. Make your choice as to which ones you want to use, what you don't want to use and then assimilate the ones you do, but always with an upgrade to the operations resources, meaning the skill sets and the personnel and other things that would go with operations, like equipment.

So that's what this project is about is to come up with a way of gauging what we need for the foreseeable modernization in the system. And then having in place a progress where we can incrementally step forward with training and skills from whatever foundation we establish in this project. So we try to establish a foundation around what we need for the -- the infrastructure now evolving, and a methodology of incrementally stepping forward every time there's some major change in the system.

And one of the things that I might point to as an example is what we're doing right now on volt/VAR management systems where we're taking a look at what we do now for voltage regulation and saying how can we do it better if you make no infrastructure changes at all, just take -- take what's there now and say is it really being done optimally, are there capacitors that are -- have a thrown switch and are not turned back on soon enough, or whatever it is that is the operating issue, and improve that. We call that

Generation Zero.

And then move on to upgrading to use of new technologies like trying to use the static VAR compensators or the back-end inverters on distributed generation storage as a part of your toolkit for volt/VAR solutions, and that's step -- that's Gen 1. And then Gen 2 is GEN 1 plus network operation as you bring online your more advanced distributed management system, how would you further enhance what you did in GEN 1 and, for example, monitor when something has failed and go out and fix it, or just automate the process of coordinating the operator of capacitor banks, inverters, and other voltage regulation equipment.

Then my last project here is the one in the right most column, and it deals with this area of customer-focused products and services. And here we are looking at the interoperability of the customer systems with the evolving distribution system infrastructure and transmission infrastructure. So it's integrating the customer system operations and impacts into the overall operation of the power system, both at the distribution and transmission level, and having a gateway, for example, where you can support the necessary information exchange between customer and utility. And the initial thing may be to use AMI for some of the basic functions.

But the feeling is beyond -- when you really get

to where you're doing everything you could in the way of cooperation between utility and customer to the benefit of rates that the customer sees and services the customer is offered, that you're probably going to need a more complicated or more capable gateway, is the right word, than you can get with AMI. So you'll need more bandwidth and ability to handle more data than you can through AMI. And just what is needed is what we're trying to address in this project and how you would implement what is needed, those are the aspects we're trying to get at here.

So that is what I have. And with that I'm going to give it back to Amanda who is going to introduce the next speaker.

MS. MOORE: Thank you very much, Frank, for providing that overview of SDG&E's second investment plan.

Next we will have an intellectual property discussion as it relates to EPIC. And that will be led by John Minnicucci of SCE.

MR. MINNICUCCI: Hi. So SCE has recently issued an RFI, a request for information, to a number of existing and potential suppliers for engineering and technical services. The decision was not entirely clear on how some of these intellectual property or aspects of intellectual property would be, I guess, dealt with or fully understood. So the respondents included 16 businesses and 5

universities, and there were three general areas of concern.

The first was, you know, what is the treatment for preexisting intellectual property? If you're working with a vendor who manufactures relays or something of that nature, they weren't entirely sure how their preexisting intellectual property would be treated. It would make sense that, you know, they developed that on their own dime and they've worked through all the issues in their own ways to develop the property, it would make sense that that property would remain with them. But they had questions of the -- you know, regarding the decision about intellectual property and the preexisting.

The second item that they were concerned about is, you know, retaining the ability to use the developed intellectual property. So as you go through this process, and if something was to be developed as a result of one of the utility demonstrations, you know, how would they either license -- or what would be the -- what would be the ability for them to use that which was developed as part of this process? Again, these are things that these respondents had taken away from the decision and were not, in their opinion, were not abundantly clear.

And then the last one is indemnity for the state of California. That's -- indemnity is one of those clauses that is very difficult to negotiate because of the, you

know, sometimes severe impacts of indemnifying another entity. And something as broad as the state of California is -- is challenging, to say the least.

The -- the main question they had there is, you know, as we go through a demonstration and we're working through, you know, some of the issues, if the data from the demonstration was used, you know, in the same manner in which it was developed, well, there probably wouldn't be too much of an issue. But if you were to use that information, work towards some other means, and then have a failure of some sort by changing the intellectual property in any way, it would not make sense to indemnify for an alteration of intellectual property.

So the intent is not to raise these as -- these are issues that were brought forth and things that we'd like to either get clarification on or work through as we go through not just EPIC 2, which is the main point of the discussion today, but the first EPIC proceeding as well.

The next item is something that's really important. I'm sure that my colleagues at San Diego and PG&E are working toward the same ends. And it's very important that we try to leverage our limited funds to the benefit of ratepayers. The Department of Energy will from time to time issue opportunities where we can double and, at times, even triple the money that is available for these

projects. But one of the difficulties in doing that is the intellectual property rights that the federal government requires and the intellectual property rights that are required under EPIC, there appear to be issues about how those two conflict, which one overrides, and really what is going to be to the greater good for -- for the ratepayers.

So a couple of items that were brought forth as examples because of SCE's American Recovery and Reinvestment Act projects relate to the DOE, of course, would need to receive all copies of reports and data and anything that comes out of the projects. The CPUC would need to agree to allow DOE to have unlimited rights in the data generated under the project because they're bringing funding toward that as well.

Patent rights; DOE typically has a nonexclusive irrevocable license in any of its inventions. ARRA was different in that there was a patent waiver issued for the ARRA projects. But, you know, your typical DOE project would include that. I don't know how palatable that would be for the CPUC or others that are involved, but it's something we should think about.

And then with respect to equipment, the federal government would have an ownership right in any equipment that was purchased for one of these projects if they were paying for it.

So that goes a little bit beyond the intellectual property. But these were items that we just thought it would be good to have a discussion on. And if you have any ideas or concerns it would be great to get those in written comments. Thank you.

MS. MOORE: Thank you very much, John, for providing that discussion on intellectual property matters.

Next we will have a discussion regarding research development and deployment journey. And that will be led by Suna Taymaz of PG&E.

MS. TAYMAZ: Great. Thanks, Amanda.

So this is the fourth public forum that the IOUs have engaged in in the past four months. And apart from that, we're utilizing other forums, as well, EPRI, talking to various other research labs, organizations, academia, etcetera. The feedback tells us we're focused on the right areas, which is -- which is good to hear. There are more areas to pursue activities than we, you know, frankly have the resources to do. So we really are focused on the near term, the non -- non-abstract, what's going to really help us integrate renewables, extend the life of our grids, and provide services, better services to our customers.

We do have a couple of learnings along the way that we want to leave you with. And there's a quote from Thomas Edison on the screen. And so he said, "I have not

failed. I've just found 10,000 ways that won't work." So we're all swinging for success here. But frankly, you know, innovation doesn't mean you hit it out of the ballpark every time. You know, best practices from other R&D groups or innovative groups tells us that in a couple of years you might hit a couple of singles, a couple of doubles, but you don't really hit out of the ballpark.

The whole process of R&D means you build upon learning, successes and failures, to get to, you know, what it is that is unique and new and cost effective. So in some cases demonstrating that a particular technology is not suitable for deployment is a success because you're avoiding rolling out something that's -- that's expensive or avoiding a larger scale investment. So we want to just emphasize, I guess, expectations here.

Building on that theme you'll see that we all presented our various potential demonstration projects. And we're aligned as far as the areas. You know, we all have common needs in common areas. And that's really by design, to build on each other's work. You know, modern innovations today weren't built based on one organization focused in a bubble in one area and then another organization, you know, carving up and looking at another area. The emphasis here is really on collaboration. The filing talks about duplication, but really I think the word really to focus on

is collaboration and making sure we build on each other's demonstrations, learn from them, and kind of take them to the next level.

What else do I have up there? So I'll also mention just on the last bullet areas, so we are building this program as of the decision which approved EPIC 1, the first EPIC Triennial Investment Program, November 14th of last year. And so what we're tasked to do is to support this innovation within the utilities, reach out to the community, support successful execution of projects, and also support strong regulatory and compliance requirements.

So innovation, flexibility, you know, utility, strong regulatory requirements, these things don't always go together very, very naturally. So each of the utilities are focused on making these things happen and be successful. And so we've come up with some -- some learnings along the way on that as well. Our role has really been to make sure we, you know, talk about our flexibility. So are portfolios designed with flexibility to be able to execute our TD&D needs? We're finding internally we play an important role in facilitating our expediting processes. So as John mentioned around the IP discussion, you know, we're really helping facilitate procurements, contracts, IP language discussions, the types of things that are really required to make this program successful.

And finally, I just want to leave you with, you know, EPIC and even the EPIC output is really the beginning of the journey. The implementation here, you know, at a larger scale is really the key goal. And so demonstrations are good. But really the objective is long-term sustainable deployments. And that comes along with its own change management needs, its own regulatory needs, its own workforce strategy and change management needs. And so that's what we're kind of looking to build, that foundation from which to advance to full-scale deployment.

I don't know if my other colleagues have anything to say on that.

MR. MINNICUCCI: Sure. I mean, the fact that you have all three utility logos on the same slide is something that's rare. And I say that at most of the workshops that we work together with on the EPIC program. And it's because we are spending a great deal of time together collaborating and working through these issues.

If you look at the American Recovery and Reinvestment Act the federal government spent, I believe it was $4.5 billion on smart grid research, deployments, etcetera, and it's not done yet. I mean, when you look at the magnitude of that number it's -- what we do here is just another piece to that bigger picture. And Suna had mentioned that, you know, there -- there are successes in

the failures. And as you test new products, as you test new approaches to doing what we do in delivering safe, reliable and affordable power, there are going to be stumblings. But what you learn from those could be the next breakthrough for either the next generation or the next technology. And that's -- that's something to keep in mind that's really important.

I'll touch just on, you know, our two ARRA projects, the Irvine Smart Grid, which is going very, very well. We're making significant progress there. We've just taken one of our storage container batteries, and that will be deployed on the Irvine Smart Grid. I mean, that was just moved out last week. So as these things move forward there's many learnings. But this will build upon that base which has already been established and it will go on into the future as there are new policies, new requirements, new customer demands on the electric grid. And it's -- it's incumbent upon us to make sure that we do this well.

MR. GOODMAN: Yeah, I'd like to just supplement it. What I tell my colleagues at SDG&E is the primary product of R&D is knowledge, that is it. No matter what the subject area of the R&D project the primary product is always knowledge. And there's only two ways an R&D project can fail. One is if you don't generate any knowledge. And two, if you don't document the knowledge. So that's the

bottom line on what you want to have and see in an R&D project description is what are you trying to do and learn and what is your documentation plan?

MR. MINNICUCCI: You know, one of the things I'd also like to note is that we meet weekly on -- as a result of this -- this program. And we've been doing almost since the inception of the program. There are some weeks that we make it every two weeks. The California Energy Commission has joined us in our weekly meetings, as well. It is very difficult to coordinate and collaborate 100 percent effectively. But the fact that we are getting together and we are working through these issues is really important and it demonstrates the desire to get this right. Again, you know, as Suna had brought up, we're not going to be perfect. But what we learn from this I think we can build upon into the -- into the future.

MS. MOORE: Thank you very much, Suna and everyone, for that insightful discussion about RD&D as it relates to EPIC.

So finally we will give the public the opportunity to make comments. So we'll start with -- if we have any comments here in the room, please let me know. Okay. It looks like we don't have any comments here in the room. We're going to check to see if we have any comments over the phone. If you have any questions or comments and you're

logged in via WebEx, please type in the chat using the chat function and I will read your question here in the room, or your comment. Okay. I guess everyone is shy today.

So if you -- if you haven't made any comments here but you realize later you do -- would like to submit a comment, please submit the comments to the IOUs by March 28th using the contact information shown on the screen very soon.

(Colloquy Between Presenters)

MS. MOORE: There is the contact information. So if you do have any comments in the next week, please -- please submit your comments to the IOUs by March 28th.

MS. DOUGHMAN: So at this point we'd like to open it for any additional comments you may have regarding the Energy Commission's proposed initiatives. Are there any comments in the room from this morning's presentation by the Energy Commission staff? Are there any comments on the WebEx? If there are, please chat your comments. Okay.

So thank you for attending. Please submit your comments by March 28th. And we'll adjourn. Thank you.

(The Commission meeting adjourned at 2:30 p.m.)

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CERTIFICATE OF REPORTER

I, MARTHA L. NELSON, an Electronic Reporter, do hereby certify that I am a disinterested person herein; that I recorded the foregoing California Energy Commission Joint Workshops on the Proposed 2015-2017 Triennial Investment Plans for the Electric Program Investment Charge Program; that it was thereafter transcribed.

I further certify that I am not of counsel or attorney for any of the parties to said conference, or in any way interested in the outcome of said conference.

IN WITNESS WHEREOF, I have hereunto set my hand this 21st day of March, 2014.

/s/ Martha L. Nelson_
MARTHA L. NELSON

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I certify that the foregoing is a correct transcript, to the best of my ability, from the electronic sound recording of the proceedings in the above-entitled matter.

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March 21, 2014